

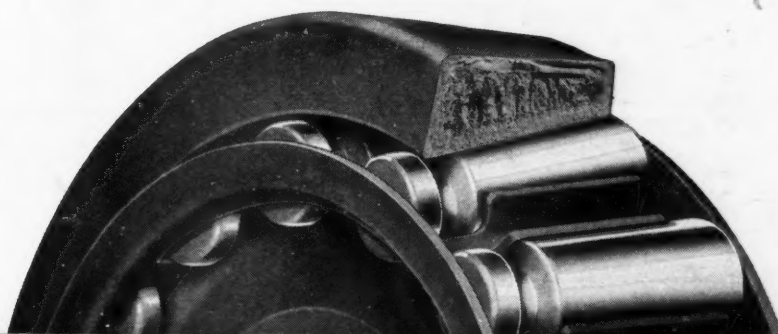
AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

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Number 16

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Ὅχι μόνον εἰς τὰς Ἡνω-
μένας Πολιτείας, ἀλλὰ καὶ
εἰς πᾶσαν ἄλλην χώραν, ὅπου
εὐρίσκονται καλῶς κατεσκευ-
ασμένα Ἀμερικανικὰ καὶ Εὐ-
ρωπαϊκὰ Αὐτοκίνητα, Φορ-
τηγὰ Αὐτοκίνητα καὶ ἐν γένει
Γεωργικαὶ Μηχαναὶ καὶ κά-
μινον χρῆσιν τῶν

TIMKEN TAPERED
ROLLER BEARINGS

εἰς μεγάλην κατανάλωσιν, δι-
αφυλάττουσι σταθερῶς τὴν
Κινητήριον Δύναμιν.

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of foreign countries as
well, Timken Tapered
Roller Bearings play
a part of ever ascend-
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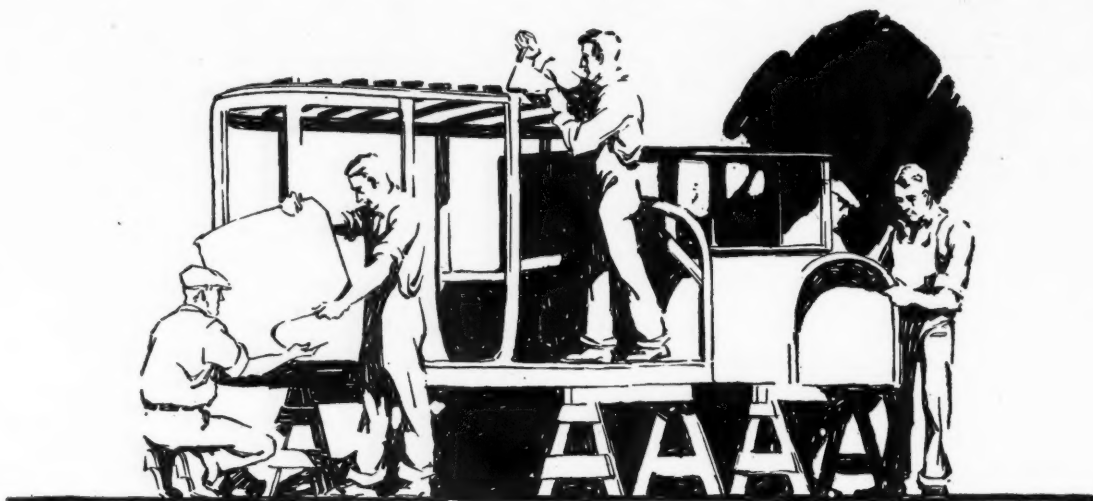
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AUTOMOTIVE INDUSTRIES

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VOL. XLV.

NEW YORK—THURSDAY, OCTOBER 20, 1921

No. 16

N.I.V.A. Discusses Difficulties of Farm Implement Industry

No immediate market, but future holds large possibilities. Dealers urge lower prices. Large inventories not yet liquidated by manufacturers. Power farming idea must be sold. Standardization necessary.

By David Beecroft

CHICAGO, October 15.

THAT leaders in the manufacture of farm equipment machinery, which includes farm tractors, are deeply concerned because of the existing depression was evidenced by the phenomenal attendance at every session of the three-day convention of these makers which ended here to-night. The National Implement and Vehicle Association, which counts within its membership practically every manufacturer of farm equipment from pumps to binders and tractors, held its twenty-eighth convention, and company executives who have not been seen at these conventions for a dozen years were on hand and sat throughout the forenoon and afternoon sessions. Approximately 150 to 175 attended throughout each session.

The program was largely drafted to suit the present exigency, which finds our agriculture at the lowest point in its history and finds these 150 or more machinery manufacturers passing through almost a complete state of selling coma. In most lines there has been a cessation of sales which set in last November and has continued with almost unbroken regularity up to the present. Call it the farmers', buyers' strike, or label it with any other name, and the situation remains the same; namely, one which has caused

very many of the factories to remain closed for months and which has resulted in material inventories not being much reduced in the last ten months. Branch houses and machinery warehouses throughout the country are stocked to the roofs with unsold farm machinery.

These farm machinery manufacturers have had one handicap during the current year which has not been at the doorstep of many other national manufacturers: They have had the misfortune, or fortune, according as you view it, of selling to one class of customers, farmers. The motor car manufacturer has had a broad selling field, the doctor, banker, lawyer, merchant, manufacturer, contractor, broker and a hundred other classifications, but these farm equipment makers have had to concentrate on one classification, the farmer.

This exclusive character of their selling field has made the present year proportionately worse in that no other class of citizens has suffered such a cut in the price of their commodities as the farmer. It is true that the farmer came through four or five years of prosperity culminating with the 1919 crop, but, unfortunately, such years of plenty found the farmer a very ready buyer, even of luxuries, and often a poor conserver of money. The high-priced crop that

he grew in 1920 suddenly stopped the buying career of almost millions.

A year ago few of us believed that the farmer was in such straitened circumstances as a few keen students of agriculture declared existed. When he stopped buying in the autumn of 1920 his case was not taken much more seriously than that of his town and city cousin; both went on a buyers' strike. But when the farmer failed to come into the market with the warm days of spring, and when he failed to enter the market when the fields were waving with ripened harvests the concern of the manufacturer grew still more real. It has only been in the last few months that the country as a whole has realized the plight of the farmer. It is only within the last few months that the truth of the farmers' buying power has become generally understood.

Last February at the national tractor show held in Columbus, Ohio, most of the tractor manufacturers were speculating on the probable time the farmer would return to the market. Then there was no doubt but that he would come in time for the spring crop and the harvest as well. It was merely a question of when and in what proportions. As spring wore on and he did not come; when summer came and went and he still held out, then the manufacturer had a complete realization of the problem that faced him. At once there arose a painful consciousness that the industry faced the greatest problem of its history.

A pretty accurate clue to the American agricultural situation was contained in the words of Hon. Henry C. Wallace, Secretary of Agriculture, speaking before the convention, and also in the same address which he delivered to over 1000 business men, members of the Chicago Association of Commerce:

"For more than a year we have passed through a period of severe agricultural depression. It has been a trying period. The prices the farmer is getting to-day for his major agricultural commodities are considerably below the prices he received for them in the five pre-war years, 1909 to 1913, inclusive. The prices for basic commodities that the farmer must buy are still above pre-war prices. Farmers constitute 40 per cent of the population of our country and you cannot have such a terrific reduction in the prices of commodities they have to sell and keep the prices of what they have to buy considerably above pre-war prices without compelling those farmers to practise the most rigid economy. This cannot happen without all industry having to suffer, and those industries most closely related to the farm—namely, farm equipment—suffer first and most severely.

"I think it true that many forehanded farmers who had money accumulations as a result of long years of work and saving have at times been unwise in their program of economy, but the psychology of the situation accounts for it, but from this time on purchases by farmers of equipment needed will gradually and steadily increase.

"We must get back onto an even keel, and it would be far better if prices of farm products could be brought up to a fair level rather than that wages and prices of other commodities should be brought down to the present level of farm prices. One or the other must happen.

When we get on an even keel again, very likely we shall find ourselves riding on a plane of prices about 50 or 60 per cent above pre-war levels, but we would reach that desirable state much sooner and with less hardship if there were a clearer recognition of the relations of agricultural property to national prosperity."

It will assist in gaining a more comprehensive conception of the present-day agricultural situation by bearing in mind that the average purchasing power of the farmer is but 70 per cent of what it was in the five pre-war years, this figure being based on current prices of thirty-one major farm commodities. Corn states are to-day quite severely hit in that the average purchasing power of corn is 50 per cent of what it was in the five pre-war years. In this may be found an explanation of why wholesale and retail motor sales have slumped very heavily in corn territory in the last few months.

With this as the background from which to study the business outlook for 1922 for farm equipment, it is not surprising that the keenest market students of this group of makers are not deluding themselves as to the demand for next year. They are not looking for any active demand for another twelve months. These makers face the situation calmly and discuss it equally calmly. They do not attempt to conceal the fact that there has been practically no buying this year; they do not look for much in 1922; but they are studying overtime to learn just what must happen.

Here is how some of the leaders are reasoning with regard to two or three years hence:

Basing calculations on the fact that farm machinery wears out every seven years; further, that during the last

four years purchasing by farmers has been 10 per cent less than normal; they estimate that to-day the average condition of farm machinery is only 80 per cent of normal. This, in the words of William Black, president of the National Implement and Vehicle Association and president of one of the large makers of farm equipment, "means that in two or three years there will come a season when the supply of new equipment will not equal the demand, and the longer the depression lasts the greater will be the demand.

"The manufacturer for the past year has been concerned with the problem of liquidation and that of earning profits, but he is now beginning to realize that the only way he can stay in business is to do business. The only way to make a profit is to sell goods, as without sales there are no profits."

One session of the convention was occupied by the leaders in manufacture wrestling with the problem of how better to conduct business so as to make a profit. These studies were entirely concerned with methods of finance, and the question of what volume of business you should attempt to do on a given amount of capital. In this program three of the leading manufacturers very frankly analyzed the affairs of their own businesses, and it was commendable to see a group of makers considering so openly and frankly this fundamental of business. They feel that fluctuations in business can largely be avoided by more careful studies.

It was disappointing in the convention that the big problem of reducing cost of merchandising to the farmer by virtue of reducing merchandising

costs was not even directly discussed. The manufacturers riveted their attention too generally on financing and company economics. There was little if anything said on greater economy in factory manufacturing methods; in fact, the subject of standardization as a means of reducing costs seems still a long way off from many of these makers.

The question of lower prices and the imperative necessity for such was brought home to the convention in no unmistakable manner by a representative of the farm equipment dealers of the country. These dealers held their annual convention last week in order to be ready to lay their thoughts on the present situation before the makers this week. There was no doubting the meaning of the message they handed to the manufacturers, and in selecting Hon. C. L. Glasgow of Michigan to present it they selected a man who apparently had no fear and one whose words showed that conviction was the major reason for what he uttered.

He openly charged the farm equipment manufacturers with bad judgment when, at the opening of the 1921 season, they increased the price of their equipment 10 per cent, apparently hoping to stampede the farmer into buying on the fear of still higher prices. That has since proved to have been a very serious error. It proved so in the motor car field. It antagonized the farmer. He lost confidence in an industry that he had been dealing with since his start in farming. Since then prices have dropped 15 to 20 per cent in general, and in some instances as high as 27 per cent, but the farmer is still obdurate, and not only does not buy but is firmly convinced that prices must come still lower, and is frankly resolved that they will go still lower before he buys.

The dealers are also convinced that prices must fall, and Mr. Glasgow, speaking for the dealers, urged all manufacturers to cut prices right down and so get the farmer in a better humor for the start of 1922 business. Unless this is done there is going to be a very heavy mortality among farm equipment dealers.

The suggestion of one manufacturer that the dealer work, work, work was openly resented by the dealers, who declared that it was little use working unless the manufacturers' price program was better suited to the condition of the times. They have worked and have witnessed farmers loaning binders, seed drills, disk harrows and tractors among themselves in order to avoid buying new ones. Some speakers at the convention who are manufacturers and own farms openly admitted that they need certain farm equipment and are borrowing from neighbors rather than buying new. They are waiting for lower prices.

While the convention apparently studiously avoided any consideration of price reductions, it is certain this subject was very much discussed by groups around luncheon tables and in quiet corners of the hotel lobby during the convention. The farm equipment manufacturers have not been able to reduce inventories very much in the past year. In the summer of 1920 they walked knee deep into too heavy purchases of materials and parts. They were led into this by sales reports of tremendous orders. Few of them realized that often these sales reports represented protecting orders from

dealers who, feeling they could not get machinery from one concern, placed orders with five or six, hoping out of all to get their demands filled. Suddenly this situation appeared, but not before vastly too heavy inventories had been accumulated. These inventories are still very largely on hand, because of the almost complete cessation of buying. Much liquidation has yet to be accomplished. In the past year these manufacturers have reduced forces in many cases to mere skeletons, they have closed factories and taken other steps, and in the year ahead it is not going to be possible for them to make further reductions; they must carry on business on the positive method of creating sales.

It is still quite apparent that standardization of machinery parts as a means of reducing costs has not been favorably received by these machinery makers. Some attention was given to this subject at the convention, one speaker, E. A. White, president of the American Society of Agricultural Engineers and engineering editor of the *Farm Implement News*, read a paper on it, but, following the general rules of the convention, there was no discussion. After the close of the session one maker, perhaps unconsciously, made one of the strongest statements in favor of standardization. He spoke of how

certain materials are costing him nearly double what they used to and in the next breath gave the reason in the small orders that it was necessary for him to place. Had certain materials been standardized by specifications there would not be much necessity for short orders. The material makers could carry stocks of standard lines, being sure of certain demand for such.

There are those who think that the farm machinery industry stands

to-day on the verge of the greatest revolution in manufacture that it has ever faced. This farm machinery crisis, the worst in its history, is driving home lessons of manufacture that formerly fell too often on deaf ears. There are some of these concerns who frankly admit they have no engineering organization but have such work in the hands of a head draftsman. It is difficult for standardization to make that progress that the times demand until each concern has a properly organized engineering department. There is still too general use of castings and scrap iron. The field of the stamping and in some cases the forging lies ahead.

There must come into the industry that spirit of co-operation in manufacture that will admit of standardization which will reduce costs.

A recent example is that of a mowing attachment for cutting hay to attach to tractors. Last summer three makers, International Harvester, Cletrac and Fordson, marketed attachments in which the old conventional mowing machine was superseded by merely a cutter bar that was carried direct on the tractor, thereby eliminating the major part of the mowing machine. There was no evidence of standardizing these cutting attachments. They were attached in three different ways; in fact, three different manufacturers built the attachments. They had but one thought, namely, of building for an individual type. It is not surprising that in some cases the prices were much higher than what the farmer had been in the habit of paying for a complete mowing ma-

THE farmer has not been overstocked with farm equipment up to this time, according to Department of Agriculture figures. There has been little business during the past year and little is likely during 1922. Wm. Black, President of the N. I. V. A., states, however, "that in two or three years there will come a season when the supply of new equipment will not equal the demand and the longer the depression lasts, the greater will be the demand."

chine, drawn by horses. In the babyhood of such an industry, thought must be given to standardization of such attachments, otherwise prices will not come down to the levels they should, and whenever prices are thus unsoundly maintained the manufacturer is contributing to erecting a wall of sales resistance. He is making it harder and more costly to do business.

Automotive manufacturers in general can cut a few leaves from the note books of farm equipment makers in the respect in which the latter study agriculture and make use of the Department of Agriculture. A few figures will give the outline of a picture that will stand study: Of the 6,500,000 farmers, the ownership of automotive equipment is about as follows:

Percentage of farmers owning motor cars.....	40
Percentage of farmers owning tractors.....	63.6
Percentage of farmers owning motor trucks.....	2
Percentage of farmers owning isolated house lighting plants	7

While the farmer has not been purchasing motor cars in the past year, there are still, according to these government figures, 60 per cent of them who yet have to purchase cars, and this in itself is a market worth studying. There is one trend that is taking place in agriculture that augurs favorably for wider buying of cars by farmers, namely, the fact that each decade finds the average size of the farm in older settled sections increasing in size, and in some of the later farm sections where too large farms have been used they are decreasing in size.

The ranks of farm equipment manufacturers are divided on just what is the best method of selling tractors. There are two schools of tractor sales; let us say two groups.

Group One has as its objective the dominant thought of selling tractors.

Group Two has as its dominant idea that of selling the power farming idea.

The two groups are widely separated in viewpoint. AUTOMOTIVE INDUSTRIES stands back of Group Two in its conception of selling. The idea must precede the machine. There has been altogether too much attempt to sell a tractor on the ground that you can plow an acre of land cheaper with a tractor than with a horse. The national tractor demonstration last summer had this fact fundamentally in mind. The motor car was never sold on the argument that you could travel two miles cheaper in a car than you can go the same distance behind a mule.

The idea of the motor car was sold whether we were conscious of it or not. It was what the car would do for the person who bought it. With the motor truck it is what the truck can accomplish by way of extending the boundaries of business and accomplishing those one hundred things that the horse and mule simply cannot accomplish.

So the school of tractor sales that has as its objective the selling of the power farming idea is going to win out. It is fundamentally sound and must win. There are today too few of the tractor makers who realize what a tractor means to a farmer. In Kansas it enables him to plow the ground in the hot days of July, when horses cannot do the job well, and thus gives a greatly increased yield of winter wheat as compared with the same land plowed in August or September.

In North Dakota it makes it possible to summer fallow in July and thus get increased yields of spring wheat.

In Illinois it enables the corn farmer to get his corn sown early in May and thus reap an increased yield.

These are facts, borne out by years of experience and attested to by scientific farmers. The tractor never will come into its own if it is just sold as a substitute for horses. So tractor sales school two is going to win out and these days of depression should stimulate its growth.

Those farm equipment manufacturers who in the halcyon war years took up the development of a line of motor trucks have not reaped the harvest visioned by them. Their business has been practically nil. It is generally conceded that it was an ill-advised move. Some of them developed too-large-capacity machines for economic farm use. They have also discovered that it calls for a different sales effort to sell trucks to farmers. The net result is that with the depression that has been rather general over the truck industry in the past year, the farm equipment makers have had no encouragement and it will not be surprising if some of them discontinue their contemplated programs. Undoubtedly the success of the International Harvester Co. had some influence on starting some of them in this field, but they may have overlooked the fact that many of the trucks built by this concern are not sold through their farm machinery dealers. There are cities where the I. H. C. has its large farm machinery branch from which it sells its farm lines, but its trucks are marketed by a dealer along automotive row or in some other suitable part of the city.

Concerning the general future of United States agriculture, there is a consensus of opinion that although the American farmer, thanks to modern machinery, produces four or five times as much food products as the European farmer, yet days calling for deep consideration of all problems are ahead. Secretary Wallace thinks that the other great agricultural nations of the world are going to play a growing part in supplying the world's needs of farm products and that our great Mississippi valley has as great if not greater farm problems ahead than it has yet faced. He favors standardization of machinery and implements and his department stands ready to assist in this work.

Up to this time the farmer has not been overstocked with farm equipment, according to Department of Agriculture figures, which show that farm equipment purchased annually represents only 5 per cent of the value of the crop. The value of farm crops for 1920 was \$9,165,348,000, and for the same year the sale of farm equipment was \$471,442,000. In agriculture man labor, power and machinery constitute 31 to 69.5 per cent of the total cost of producing crops.

There has been in demand to changing times a heavy elimination in the number of types of different farm implements in the last seventy years, as shown by the following figures. The first column shows the number of models eliminated and the second column the number retained:

Machine	Type Eliminated	Type Retained
Seed drills	32	18
Mowing machines	2	6
Disk harrows	53	44
Corn planters	759	29
Riding plows	32	16
Walking plows	179	34
Cultivators	165	10
Wagons	4,336	224

These figures do not refer to trade models but to types. One example cited as to how standardization might be carried out was that of the left-hand plow. There is nothing that a left-hand plow can do but can be done equally well with a right-hand plow. Notwithstanding this the manufacture of the left-hand design is continued

(Continued on page 772)

Excellent Technical Papers Read at Gear Makers' Convention

Detailed program of standardization work as formulated at Niagara Falls committee meeting was ratified. Members witnessed new machines for bevel gear manufacture in operation. Two new companies were admitted to membership. Various committee reports were presented.

By P. M. Heldt

A NUMBER of excellent technical papers were presented at the semi-annual convention of the American Gear Manufacturers' Association, which was held at the Powers Hotel, Rochester, Oct. 13 to 15. In the line of standardization work, a definite program to guide the activities of the different subcommittees—which program was worked out at a meeting of the Standards Committee at Niagara Falls last summer—was ratified, with slight changes and additions in some cases. The program of the convention also included a visit of inspection to the Gleason Works, where a number of new gear cutting machines were shown the members, and a clambake at Corbett's Glen as the guests of the Gleason Works.

In the report of the Secretary it was brought out that the Association is still growing; at the time the convention opened it had 92 member companies with 110 executive and 59 associate members, making a total of 169 members. Two applications for company membership were favorably voted on at the meeting. The new companies admitted were the Central Products Co. of Detroit and the Harris Machine Co. of Bridgeport, Conn. It was announced that a foreign membership clause was to be added to the constitution for the benefit of firms in the gear business in other countries.

Cost Accounting

J. H. Dunn presented the report of the Committee on Uniform Cost Accounting. He said that the committee had issued a questionnaire to the membership concerning their cost accounting practice, but that the returns from this had been rather unsatisfactory. President Sinram, referring to this report, said that practically all member companies were running very light and had cut their overhead expense as low as possible, so that insufficient office help might account for the fact that no more replies had been received; but as business was getting nearer to normal again all would be in need of the information which the questionnaire was to bring out, and he urged members to give the committee all possible help in the future.

The questionnaire of the committee brought in replies from 44 member companies, of which seven had less than 50 employees, 11 between 50 and 100, 15 between 100 and 500, six between 500 and 1000 and three over 1000, while two did not state the number of employees. Of these same companies 16 had adopted the Association's system of uniform cost accounting, five used a similar system and one had adopted it in part. The machine-hour rate by machine or group is used by 16 companies; one percentage of direct labor for entire plant, by 14 companies, departmental percentage of direct labor rate, by 8 companies and the productive hour rate by two. Thirty-six companies

stated that they had the totals of the amount of factory expenses to compare with the total amount distributed to cost of jobs. The following table gives a survey of the methods of distributing administrative, general and selling expenses to costs:

	Companies
Percentage of factory cost.....	22
Combined with shop overhead and distributed on a percentage of direct labor basis.....	7
Combined with shop overhead and included in machine rate	1
On productive hour basis	3
On productive labor basis.....	2
Percentage of sales	1
Do not keep job costs	1
Question not answered	7

44

In discussing the problem of cost accounting, Geo. Markland said that his firm in making cost estimates used the machine rate basis, but doing this in obtaining their actual costs in case they were awarded the job took too much time under present conditions.

In connection with the report of the Industrial Relations Committee and the discussion thereon a warning was issued to members by one of the speakers not to take any work below cost; if they were doing so because they thought it would cut down their overhead, they were fooling themselves. Another point brought out was that if allowance is made for the increase in freight rates, steel is selling cheaper to-day than it was before the war.

Standards Committee Report

B. F. Waterman made a report for the sectional committee of the American Engineering Standards Committee. He said that Mr. Buckingham, vice-chairman of that committee, had now in hand the preparation of a digest of all standardization work on gears that had been done in this country and abroad. A letter had been received from the German Standardization Committee asking for information on stub tooth standards. The Canadian Engineering Standards Committee had offered to co-operate with the American Engineering Standards Committee and had been asked to send a representative to each executive meeting. A copy had been received of the French stub tooth standard, based on the metric system, with a request that it be considered by the committee.

Tooth Wear with Different Steels

A paper on Tooth Wear with Different Gear Steels, by E. R. Ross, experimental engineer of the Warner Gear Co., was presented by S. O. White, chief engineer of the same company. The intermediate speed gears of a three-

speed transmission were run under heavy load for a period of six hours and the wear on the tooth flanks was carefully measured with a micrometer caliper. Gears of different steels, both oil hardening and case hardening, were thus experimented with, and the results plotted in the form of wear diagrams. We expect to reprint this paper in an early issue. Mr. White was asked what he considered to be the best backlash between the teeth of a transmission gear; he replied that this had nothing to do with the subject of the paper, but that his company generally allowed between 0.007 and 0.008 in. backlash. It was also asked why it was that the diagrams all showed the greatest wear to occur at the pitch line, when it was a well-established fact that at the pitch line action was that of pure rolling motion. It was explained that this was due to the dwell at the pitch line, which allowed time for the oil to be squeezed out between the contacting surfaces and thus causing maximum wear at that line. A curve of temperature rise showed that the oil on the transmission case attained a working temperature of 274 deg. Fahr. in the tests, and Mr. White said that it was then about as thin as kerosene.

On Thursday evening E. S. Sawtelle, assistant general manager of the Tool Steel Gear & Pinion Co. of Cincinnati, gave a talk on a European trip made by him the past summer. He dwelt mainly on points that arouse the interest of the general tourist, but also gave some impressions of business conditions in the several countries visited and their possible effect on American export trade in the future. Mr. Sawtelle visited England, Holland, France, Switzerland and Germany.

Duralumin as a Gear Material

On Friday morning R. W. Daniels of the Baush Machine Tool Co. presented a paper on Duralumin as a Material for Worm and Other Gearing. Mr. Daniels first gave an outline of the history, composition, heat treatment and mechanical properties of duralumin and then discussed its adaptability to worm wheels and other types of gearing. He said in substance:

Duralumin is an ideal material for worm wheels, provided the bearing or wearing qualities are satisfactory. For a given section the weight is one-third that of the conventional bronze. The tensile strength and relative high elastic limit insure superior tooth strength. The homogeneous structure and uniform hardness of heat treated duralumin forgings insure entire freedom from hard spots, porosity and spongy areas so common in bronze castings, which entail not only machine loss but uneven tooth wear in service. The excellent machining qualities insure the manufacturer a saving in his machining costs over bronze.

The wearing qualities of worm wheels for automotive purposes is best determined by actual road service, as bench or laboratory test results do not always correspond. It is instructive, however, to compare results obtained from duralumin with those of other materials under identical conditions. The data from various laboratory tests under the writer's observations on bronze and duralumin worm wheels may be summarized by saying that tests destructive to duralumin worm wheels were also destructive to those made of bronze. Where duralumin and hardened steel are run together the results are always good. An example of this application is shown by duralumin connecting rods running direct on the wristpins with better life at this point than with the conventional bronze bushed rod of equal bearing area.

Comparative tests of bearings made from duralumin against bearings made of genuine babbitt, show that for shaft speeds exceeding 700 r.p.m. and loads over 200 lb. per sq. in., duralumin bearings develop less friction, re-

main cooler and show practically no loss in weight under most severe conditions. For lower bearing pressure and lower speeds, babbitt metal is superior.

Tested on Fifth Avenue Buses

Some tests made by the Research Department of the Fifth Avenue Coach Co. on worm wheels of duralumin were quoted by Mr. Daniels. Three duralumin worm wheels were procured and installed in the standard worm carriers, and road tests were started on three buses (2-A type.) These wheels were inspected periodically during the first few weeks' service, and again at the time of the next annual overhaul of the buses. The results obtained with these sample worm wheels are given in the following table:

	Bus 30Z	39	40
Date in	8/27/20	9/15/20	9/11/20
Date removed	6/20/21	In Service	6/17/21
Mileage.	26,672	24,143	32,253
Miles per gal., aver.	6.75	6.52	6.65

From this it will be seen that 83,068 miles were covered with these units, all of which at the end of the period showed excellent resistance to wear along the pitch line. In the case of one unit there had been a failure of the bearing behind the worm, and the sides of this wheel were slightly chipped, but not sufficient to prevent it from being put back in service with the others. Inspection of the wheels after the above service indicated wearing qualities equal to those of the standard bronze gear wheel. In view of the advantages to be gained from the use of this material, the acquisition of several more, for a more exhaustive test, was recommended.

Examination of the lubricating oil threw an interesting light on conditions of wear. With bronze wheels, if the oil has not been changed for a long time, an examination of the oil always shows particles of bronze in suspension. This not only indicates wear, but also deterioration of the lubricating value.

For Gears of Other Types

The same qualities that make duralumin a desirable material for automotive worm wheels also make it valuable for plain spur and other gearing. It is suitable for this class of work where the pressures are sufficiently within its elastic limit of 30,000 lb. per sq. in. Where this condition is met, and weight and quietness are desirable, it replaces iron, steel, brass, fiber, fabric, etc. Where duralumin can be run with steel rather than against itself, the best results are obtained. An example of this application is found in the timing gear trains of automobile motors where both long life and quietness are essential.

Helical cut spur gears of duralumin alternated with steel gears have been most successful in service. Detailed test reports are not especially interesting, as the gear design varies with every motor, but the fact that upwards of 60,000 duralumin camshaft and idler gears are now in use, is conclusive.

Further Standards Reports

A number of reports by subcommittees of the Standards Committee were presented on Friday afternoon and evening, discussed and acted upon. Some of these contained only the program according to which the subcommittee planned to work, while others contained definite proposals in the way of standardization.

Frank E. Eberhardt presented the report of the Spur Gear Sub-Committee. In this connection it was recommended by Frank Burgess that when the committee gets to work it adopt a rule prescribing a greater face width for a pinion than for the mating gear. J. B. Foote reverted to the matter of the rule for face width, discussed

at some length at the previous meeting in Cincinnati. He said that the multiplier 9, which had been used for many years, was based on scientific considerations and should not be discarded in favor of 10, as proposed, unless good reasons for the change could be adduced. The report was adopted. The report of the Sub-Committee on Gears and Pinions for Electric Railways and Mines, presented by Chairman W. H. Phillips, was also adopted.

A Nomenclature Sub-Committee has been appointed which consists of the chairmen of all the other sub-committees. This has been collecting names, terms, symbols and formulae from catalogs, lists and books, and they are now going over these lists of terms, etc., to eliminate inconsistencies. A report of progress was made and this was adopted.

J. C. O'Brien made a report for the Sub-Committee on Worms, Worm Gears and Spirals. This committee will be known hereafter as the Sub-Committee on Worm Gears. Frank Eberhardt stated that one of the most important items in the program of this committee was the collection of data on successful and unsuccessful worm gears. After a change in the order of the items in the program the report was adopted.

Inspection Methods

F. G. Eppley read the report of the Inspection Sub-Committee. This also covered only the program of the work the committee plans to do, with some comments on the different items. It was noted from this report that the committee is making some efforts to obtain a standard of comparison and a means of making comparisons of gear noises. It was stated that the Bureau of Standards is now working on a method of measuring sound. In connection with this report it was pointed out by one of the members that the methods of inspection worked out would be used by customers of the gear makers, and that therefore no tests and no standards should be recommended which were of such a high order that they could not be lived up to by the members. Mr. Phillips said that his company had an inspection method for each type of gearing and other companies undoubtedly the same, and he suggested that all these data be turned over to the Inspection Sub-Committee. B. F. Waterman said that it would be necessary to differentiate between manufacturer's tests and customer's tests as regards instruments to be used, and that any test standardized must be commercial. The report was adopted.

The report of the Bevel and Spiral Bevel Gear Sub-Committee, F. E. McMullen, chairman, also was merely a program of the work to be done and was approved of by the meeting. C. R. Weiss, chairman of the Sprocket Committee, presented the report of that committee. In addition to the program for future work, this covered matters which have already been adopted by the S. A. E. and the A. S. M. E. and are therefore known. The report was adopted.

Special Steel Specifications Discarded

C. B. Hamilton, Jr., chairman of the Metallurgical Sub-Committee, reported for that body. This committee some time ago worked up specifications for a special screw stock, but in as much as the screw stock specifications of the S. A. E. and the A. S. T. M. are alike, it was felt that there was no need for introducing an additional specification, and this proposal was therefore dropped. In fact, it was decided to drop all of the special steel specifications of the American Gear Manufacturers' Association (known as A. G. M. A. steels) with one exception. This is the 1045 A. G. M. A. steel, which differs from the No. 1045 S. A. E. steel in having 0.30 to 0.60 per cent manganese instead of 0.50 to 0.80 per cent. Mr. Frost said that he had always objected to the No. 1020 S. A. E. steel, which has a

carbon range of from 15 to 25 points. If you happen to get practically the maximum carbon limit and at the same time high manganese content, it is impossible to properly carbonize the steel. There was some discussion as to the advisability of eliminating this steel from the list, but it was brought out that it is one of the most widely used gear steels; moreover, the proposal to use the 1015 steel instead met with the objection that with this specially low carbon steel it is hard to keep down the sulphur content. Mr. Frost said that he was not speaking from selfish motives, as his firm tested every shipment of steel it received, but some of the other firms which had no testing facilities might possibly have trouble. He suggested that if the proposed table of specifications be adopted it be printed with a foot-note warning users of the danger pointed out by him. The report was adopted as revised. Proposed brass and bronze specifications, which cover S. A. E. specifications Nos. 62 to 65 inclusive, were adopted. For steel castings the committee proposed the adoption of the specification already in use by the A. S. T. M. (Specification A-27-21), with the addition: "All gear castings must be properly annealed." This part of the report was also adopted.

In connection with the report of the Keyways Committee, Mr. Burgess made an appeal for multiple keyways, as a single key in his estimation was not sufficiently secure, but W. H. Diefendorf suggested that he use a taper on his shaft and a nut on same, in which case he would not need multiple keys. This, too, was only a progress report and was adopted. Mr. Petersen, who represented the S. A. E. Iron and Steel Division at the convention, requested that two members of the A. G. M. A. metallurgical committee be delegated to attend every meeting of the Iron and Steel Division. This request was acceded to.

Visit to Gleason Works

On Friday afternoon a visit was made to the plant of the Gleason Works. There J. B. Foote of Chicago spoke on some of the welfare features introduced by the Gleasons for the benefit of their employees. These included old age pensions, a dining room, a library, musical entertainments and a mutual aid society. In the factory the members inspected a number of new machines used in the production of bevel gears, including a 4-in. spiral bevel gear generator, an 8-in. spiral bevel gear generator (used among other things for the production of spiral bevel gears for driving overhead camshafts) a bevel gear burnishing machine, a 38-in. two-tool gear planer, a 9-in. two-tool gear generator, a three-spindle bevel gear rougher, a three-spindle bevel gear generator and a tool grinder for the 4-in. spiral generator.

On Friday evening the association held its banquet at the Powers Hotel. J. E. Gleason acted as toastmaster, and the speakers were the Hon. Arthur E. Sutherland, who spoke on "Capital and Labor," and Ernest Paviour, former president of the Rochester Ad Club, who spoke on "Advertising."

On Saturday morning, at the final session of the convention, E. W. Miller, chief engineer of the Fellows Gear Shaper Co., presented a paper on "Tooth Forms." Mr. Miller said that the only tooth curve which deserved consideration was the involute, but he showed that even by adhering to this curve there was a possibility of considerable variation in the form and efficiency of the tooth by changing the part of the involute to the base circle which is used. It was proven that in order to have a tooth form system which could be produced by all of the methods now extant, it was necessary to use a pressure angle of 24 deg. and a few minutes, if the whole system from a 12-tooth pinion to a rack was to be interchangeable. We expect to reprint this paper in an early issue.

First German Automobile Show in Ten Years

Marks re-entry of German automobile industry into world competition. Some concerns book orders for year's production. Forty-six manufacturers show 90 models ranging from 14 to 75 hp. Four-cylinder and L-head engine and four-speed gearset predominate. One stock engine shown.

By W. F. Bradley

BERLIN'S automobile show, the first since 1911, marks the complete re-entry of the German automobile industry into world competition. The show is held in a big hall specially built by the German automobile manufacturers for exhibition purposes, and finished just before the outbreak of war. At the same time the German makers opened their own speedway, the only one of its kind on the Continent. This has its main entrances some 200 yards from the exhibition hall. This track undoubtedly served as an immense attraction to the show. It is estimated that on the opening and following days 500,000 persons paid for admission to the speedway. On the days of the race tickets were resold privately at a minimum of 1000 marks.

Business conditions at the show were entirely satisfactory, and as a result of the exhibition many factories are booked up with orders for one year. Berlin is full of foreign buyers, who are interested, among other things, in automobiles because of the low price made possible by reason of the depreciated value of the mark. For the purpose of rough comparison the value of the mark may be taken as being equal to one cent in American currency. Sometimes it gets a little above this figure, but more often it is below. On this basis the most costly car in the Berlin show is the Maybach 90-hp. six-cylinder which, with high-grade open body and all modern fittings, is listed at \$4,300. A few other prices, selected haphazard, are as follows:

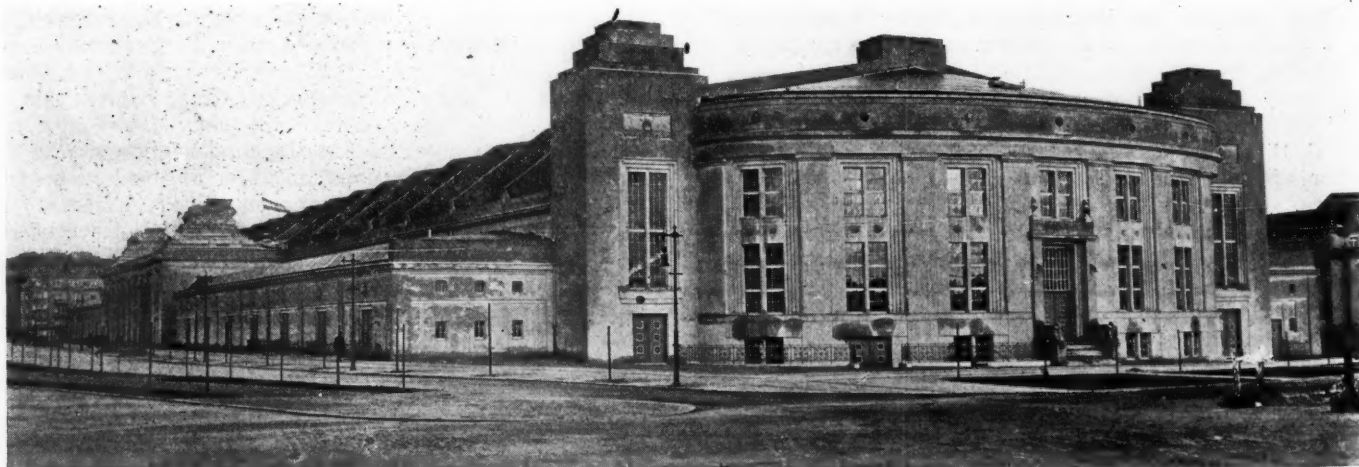
Mercedes, 6 cyl., 90 hp., open body	\$3,300
Benz, 6 cyl., 50 hp., open body	3,200
Opel, 6 cyl., 75 hp., open body	3,000
Horch, 6 cyl., 80 hp., open body	2,750

Rumpler, 6 cyl., 50 hp., open body	\$1,500
Rumpler, 6 cyl., 50 hp., sedan body	2,000
Adler, 4 cyl., 18 hp., open body	1,300
Adler, 4 cyl., 26 hp., open body	1,800
Dinos, 4 cyl., 30 hp., open body	1,600
Ego, 4 cyl., 20 hp., 2 seater open body	710
Brennabor, 4 cyl., 25 hp., open body	700
Bob, 4 cyl., 20 hp., 2 seater	620

The majority of these are really high-grade cars with excellent body work, comparable to the most costly types produced in America or elsewhere. The open six-cylinder Rumpler, for instance, is a car which would be sold in any other European country at twice the price asked on the Berlin market. Considered as a whole, equivalent models built by Italian, French, Belgian or English firms would cost 50 to 75 per cent more in American currency. In all cases these are retail selling prices in Berlin. For export business lower prices would prevail.

In the above list the only car really laid out for cheap production is the four-cylinder Brennabor, designated as 25 hp. This power, in common with others quoted above, is really the actual power of the engine, an equivalent rating in other European countries being 10 to 15 hp.

Germany is in a position to challenge the world with medium and high grade cars which are cheaper than those of any other nation by reason of the depreciated value of the mark. There has been very little attempt as yet to get down to low prices by simplified design and cheap production methods, as they are known in America. One of the reasons for this is that the home market is very small, and the foreign market being varied, it is difficult to select one type which will be successful for a wide range of



Germany's new building used exclusively for automobile show purposes and known as Kaiserdamm Palace

countries. Another reason is that Germany has not yet had time to learn the lessons of cheap production, and her engineers have preferred to continue on the same general lines as before the war, merely bringing their chassis up-to-date in comparison with French, English and Italian makes.

The three companies best known on the world's market are Mercedes, Benz and Opel, all of which are purely automobile concerns, unconnected with other industries. Some of the others, although not so well known abroad, are linked up with very powerful combinations. N. A. G. forms a branch of the A. E. G. (German General Electric Co.), which in turn is allied in a certain measure with the American General Electric. The Protos Co. is a branch of the Siemens Electric concern, one of the biggest manufacturing and industrial organizations in Germany. The Dinos car is in the hands of Hugo Stinnes, probably the biggest manipulator of capital in Europe. Krupp, of gun fame, is also interested in automobile construction, but up to the present the factory has confined its attention to trucks and scooters.

While capable of competing on nearly all foreign markets, with the exception of France, where there is a prohibitive duty against former enemy countries, Germany is doubly protected in her own territory. Not only does the exchange rate make it impossible to import cars into Germany, but it is necessary at the present time to obtain a Government permit to import, and this is not readily given. This state of affairs applies not only to automobiles, but to tires and all accessories. There is an opportunity, however, for American capital to interest itself in the German industry. This has been done by Goodrich, who has secured 50 per cent of the shares of the Continental Tire & Rubber Company of Hanover. Packard has also just bought the Ventzky automobile factory at Graudenz (now named Grudziacz), in West Poland, formerly Prussian territory. It is reported, although no confirmation of this has been obtained, that the Ford Motor Co. has secured a controlling interest in the Hansa-Lloyd Company. Among accessory firms, Klaxon and Zenith manufacture in Germany.

Show Statistics

Forty-six passenger car manufacturers are represented at the Berlin show, these firms producing 90 models. Twenty factories build one type only; 15 produce 2 models, 5 have 3 models, 5 have 4 models, and one firm produces 5 different types. About one dozen of these firms are interested also in automobile trucks. The 90 models represented at the show can be divided as follows as regards horsepower:

- 5 models with engines of about 14 hp.
- 3 models with engines of about 15 hp.
- 11 models with engines of about 18 hp.
- 13 models with engines of about 24 hp.
- 4 models with engines of about 25 hp.
- 18 models with engines of about 30 hp.
- 3 models with engines of about 40 hp.
- 13 models with engines of about 45 hp.
- 3 models with engines of about 50 hp.
- 7 models with engines of about 55 hp.
- 4 models with engines of about 75 hp. and more.

The bore-stroke ratios and the engine speed are given in the following table, which indicates the minimum and the maximum:



General view of the recent German automobile show

Brake hp.	Bore-stroke-ratio	R.p.m.
14	1.1 -1.5	1800-2400
15	1.3 -1.55	1600-2500
18	1.25-1.8	1800-2600
24	1.25-1.8	1500-2600
26	1.3 -1.9	1400-2200
30	1.35-2.1	1400-2200
40	1.35-1.7	1600-2200
45	1.3 -1.7	1400-2000
50	1.3 -1.6	1400-2000
55	1.4 -1.45	1400-2200
75	1.1 -1.5	1400-1600

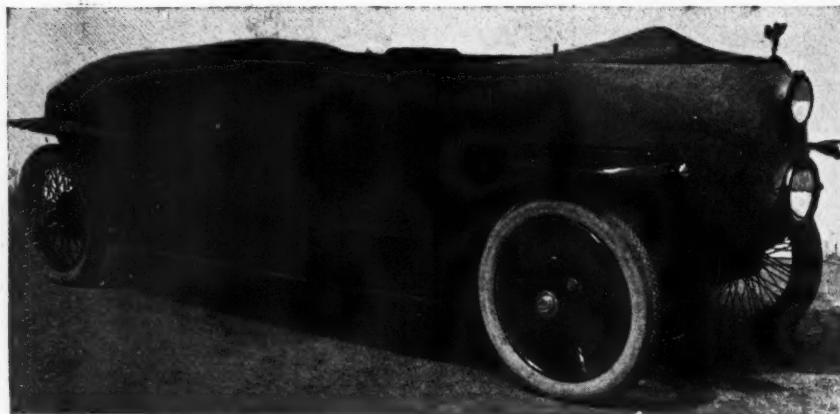
The four-cylinder engine is used in 80 per cent of German automobiles. Six-cylinder engines represent 16.6 per cent, eight-cylinders are 1.13 per cent, and twins and singles are each 1.13 per cent. Germany has not been carried away with the multi-cylinder idea, for there is only one eight-cylinder in the show, this being the Apollo V-type. There is also only one single-cylinder, a two-stroke air-cooled used in a cyclecar.

Vertical cylinders are used on 96.6 per cent of the engines; the W-type is used on the Rumpler six-cylinder, and represents 1.13 per cent of the whole; the V-type is also in the proportion of 1.13 per cent, as applied to the Apollo eight, and the horizontal opposed is 1.13 per cent.

Four-cylinder engines are in one casting in 83.2 per cent of the models; and pairs 16.8 per cent. For six-cylinder engines block casting is found on 33.3 per cent, pairs in 40 per cent, and in threes on 26.7 per cent. In the great majority of cases cylinders are grey iron casting. Mercedes is using steel cylinders for all poppet valve models. There is an increased number of aluminum cylinders with steel liners, most of these having cylinders and crankcase in one casting, detachable heads and overhead valves. Examples are Dinos, Audi, B. M. W., Swave, and Horch. Detachable heads represent only 11 per cent of the whole, while aluminum pistons are used on 42.2 per cent of all models.

Head Type Predominates

The L-head engine is at the top of the list with 67.7 per cent, followed by the overhead valve type with 21.1 per cent. L-head engines with inclined valves are 3.3 per cent.



The novel Rumpler car with powerplant aft. Note the appearance of the streamline body

The Knight engine is used by Mercedes, the proportion being 2.2 per cent. There are no other substitutes for the poppet valve. One valve in the head and one operated from below is found on 4.4 per cent of the cars.

On four-cylinder engines the crankshaft bearings are as follows: 2 plain bearings, 5.5 per cent; 3 plain, 76.4 per cent; 4 plain, 4.4 per cent (Dinos car); 2 ball bearings, 6.9 per cent; 3 ball bearings, 2.7 per cent; 4 ball bearings, 1.3 per cent; 5 ball bearings, 2.7 per cent. On six-cylinder engines the proportions are 2 plain bearings, 6.7 per cent; 3 plain, 6.7 per cent; 4 plain, 66.6 per cent; 7 plain, 20 per cent. Ball bearing shafts are not used for six-cylinder engines. The front end drive is by spur pinions on 27.7 per cent of the engines; spiral bevels are used on 21.1 per cent, and chain drive on 43.3 per cent. Bevel gear drive for overhead camshaft is used on 7.9 per cent of the engines.

Cooling is about equally divided between thermo-syphon and pump circulation, the former representing 47.7 per cent and the latter 48.8 per cent. Air cooling represents 3.5 per cent. Fan designs are as follows:

Aluminum	Sheet Steel
2 blade 14.9 per cent	2 blade 14.6 per cent
3 blade 33.3 per cent	3 blade 18.4 per cent
4 blade 11.4 per cent	4 blade 4.8 per cent
6 blade 2.4 per cent	Flywheel-fan 4.8 per cent

Radiator cores are 83.9 per cent tubular and 16.1 per cent honeycomb type. Pointed radiators are found on 92.2 per cent of the cars, half round on 2.3 per cent, and flat on 5.5 per cent. Materials used for the radiator shell are brass, 93.1 per cent; German silver, 2.2 per cent; copper, 3.4 per cent, and aluminum, 1.2 per cent.

The full pressure lubricating system holds the field with 74.4 per cent, combined splash and pressure is 17.7 per cent, splash system 3.5 per cent, and Bosch oiling system 4.4 per cent. Gear type oil pumps are 63.9 per cent of the whole; eccentric pumps, 16.3 per cent; plunger pumps, 19.8 per cent.

In the carburetor field Zenith has a proportion of 38.8 per cent; Pallas, 31.1 per cent; other makes, 15.7 per cent, and car makers' own carburetors are 14.4 per cent. Carburetor control is 1.2 per cent by hand only, 8.7 per cent by accelerator pedal only, and 90 per cent with both. The gasoline tank is at the rear on 78.3 per cent of the cars, on the dash on 21.6 per cent, and below the driver's seat on 1.1 per cent. Fuel feeds are 11.1 exhaust pressure, 22.3 air pressure, 45.5 vacuum, 21.1 gravity.

Ignition Systems

Ignition by a single magneto is 90.3 per cent; double ignition is 6.6 per cent, and battery-dynamo 2.2 per cent. Bosch equips 80 per cent of the cars with magnetos. Spark

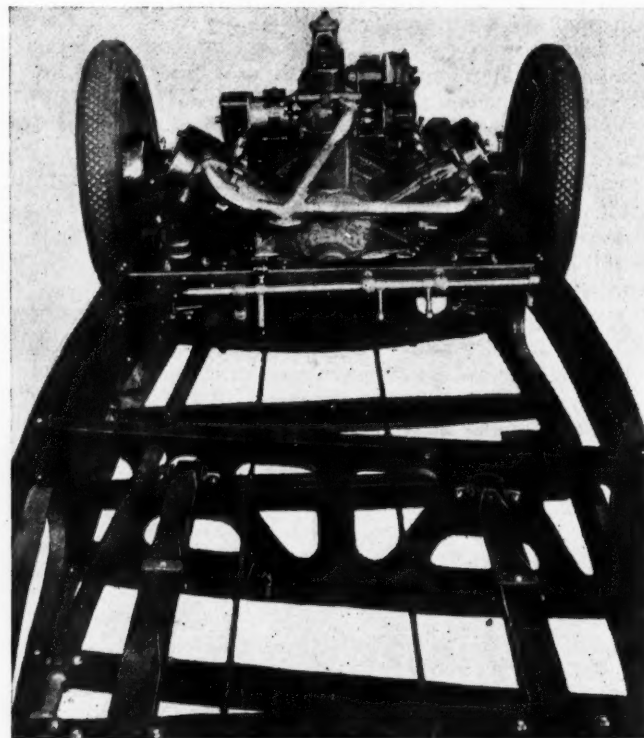
control is by hand lever on 72.2 per cent of the cars, fixed on 8.8 per cent, and automatic on 20 per cent. N. A. G. has a combination of hand lever and automatic control. Electric lighting is used on 94.5 per cent of the cars, practically all of these being Bosch, and acetylene on 5.5 per cent. Electric starting is 67.7 per cent, and cars without starter 32.3 per cent. Battery boxes are mounted on the running board on 60.1 per cent of the cars, inside the frame on 30.1 per cent, and below driver's seat on 9.4 per cent.

The clutch systems are 48.2 per cent leather cone; Ferodo cone, 16.6 per cent; double cone, 4.4 per cent; metal cone, 5.5 per cent; steel disks, 14.4 per cent; brass and steel disks, 7.7 per cent; dry disks, 3.3 per cent; three plate, 4.4 per cent; extension clutches, 1.1 per cent, and reversed cone, 4.4 per cent. A clutch stop is fitted on 58.8 per cent of the cars.

Unit construction of engine and transmission is 21.1 per cent; engine and transmission separate is 75.6 per cent, and transmission on rear axle 1.1 per cent. Rumpler has engine and transmission forming a block mounted at the rear, the percentage being 2.2. Four speeds ahead represent 83.4 per cent; three-speed transmissions, 14.4 per cent; two-speeds, 1.1 per cent, and a single-speed, 1.1 per cent. This latter is the Maybach so-called transmission-less car.

Spiral bevel gears for the final drive are 39 per cent; straight bevels, 58.6 per cent, and worm gear, 2.4 per cent. Differentials are nearly all bevel type, only four cars having spur gear differentials.

Wood wheels hold the premier position with 40 per cent; wire wheels, 27.7 per cent; steel disk wheels, 11.1 per cent; steel spoke wheels, 18 per cent. Detachable wheels are 43.2 per cent; detachable rims, 53.3 per cent; fixed wheels and rims are 4.5 per cent. All rims are clincher bead



Rear end of Rumpler chassis. The W-type engine, gearbox and differential housing are built in one unit, most of the weight being sprung. The springs are inside the chassis frame

type. Front axles are 37.5 per cent open jaw type and 62.5 per cent closed jaw.

Front springs are 91.2 per cent half-elliptic, 3.3 per cent cantilever (Rumpler car), 3.3 per cent transverse, and 2.2 per cent quarter-elliptic. At the rear 62.1 per cent are half-elliptic, 24.4 per cent cantilever, 6.6 per cent three-quarter-elliptic, 2.2 per cent transverse, 1.1 per cent quarter-elliptic, 1.1 per cent spiral, and 2.5 per cent other systems.

Right-hand steering and right-hand control represents 89.4 per cent; left-hand steering with center control is 6.7 per cent, and right-hand steering with center control 3.6 per cent. Steering-gear is worm and sector on 43.3 per cent; screw and nut on 55.5 per cent, and other types 1.1 per cent.

Front wheel brakes have only just made their appearance in Germany, being found only on 2.2 per cent of the cars. Foot brake on the transmission is 91.2 per cent and on rear wheels 8.8 per cent; hand operated brake on rear wheels is 97.8 per cent. Fifty-seven per cent of transmission brakes are external and 33 per cent internal. Only 3.6 per cent of these are water cooled. The percentage of external rear brakes is 4.4. Brake equalizers are 82.2 per cent by balance lever, 14.4 per cent by cable and 3.3 per cent by bevel gears.

The following chassis weights, without fuel and oil, show wide ranges of difference. In each case the lightest and the heaviest chassis has been taken.

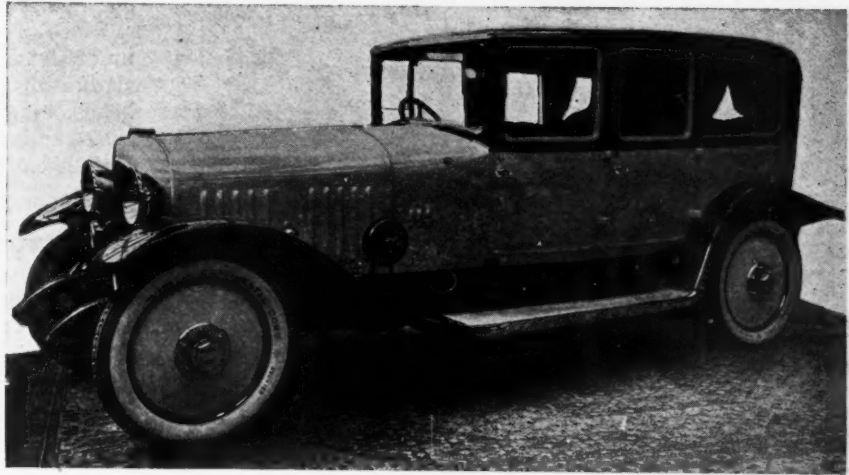
Engine hp.	14	15	18	24	30	45	55	75 and more
Weight in pounds:	840	925	1150	1655	1985	2115	2645	about 3970
	1100	1230	1870	2095	2910	3085	3750	

Rumpler Design Radical

Two cars stand out as distinctly different from the others. They are the Rumpler and the Maybach. Before becoming an airplane manufacturer Rumpler was chief designer in some of the leading German automobile factories, and has tackled the problem of automobile production from the double standpoint of the automobile engineer and the aviation expert. He has sought to eliminate unsprung weight and by the general arrangement of his chassis to obtain the best stream-line form. While other makers have sought to reduce head resistance by modifications of existing types of chassis, Rumpler has laid his whole car out with stream lining in view. These cars attracted immense attention and generally favorable comment, despite their unusual appearance. Rumpler puts his engine and transmission at the rear, inside a boat-type chassis. He has adopted a six-cylinder W-type engine with all-aluminum cylinder and overhead valves, but any type of four-cylinder engine can be used equally well.

A clutch and gearbox form a unit with the engine, and the final drive is through a common differential to the two road wheels, there being two driving and two driven pinions, of different size, but with the same ratios. On the inner end of each of the two axle housings is a bronze semi-circular guide to allow of the rise and fall of the axle as the wheel passes over obstacles on the road. There is a stay from each extremity of the axle housing to a bronze bushed trunnion bearing on a rear extension of the differential housing. With this design, which Rumpler declares to be fully covered by patents, the only unsprung weight is the wheel, the driveshaft and a portion of the spring.

Cantilever springs are used front and rear, the front springs being entirely inside the boat type chassis, and the rear springs having about half their length inside the



The Maybach six-cylinder "transmissionless" car with salon body was the most expensive car at the Berlin show

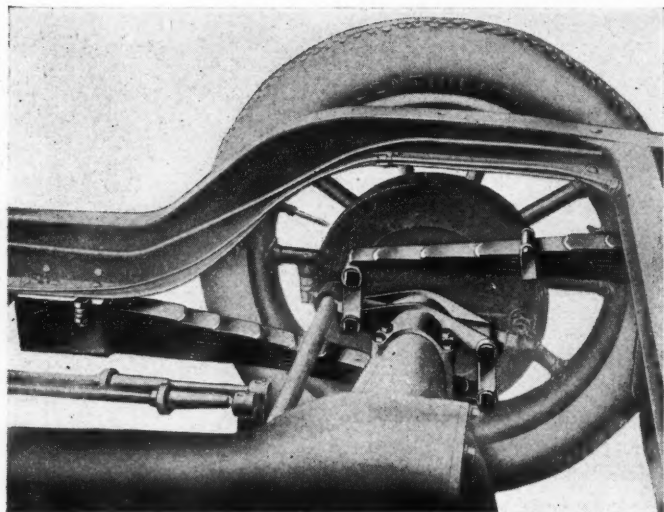
frame. Steering is at the front, with the axle and steering control lever passing through openings in the frame. This design gives an exceptionally low center of gravity. Even the spare wheels are carried inside the frame. Each one is placed flat on a small bogey, which is pushed through openings in the frame on to rails flush with the bottom flange of the frame members. A perfectly stream-lined body is mounted on this chassis. The underpan is just as efficient as the upper works, and no provision is made for external projections which would spoil the effect sought. It is impossible to hang a trunk or a bag on the outside of the car. Fenders, door steps, headlights and windscreen are all treated from an aviation standpoint. The rear seat is practically in the center of gravity and all passengers are carried within the wheelbase. In addition to building this car himself, Rumpler is arranging to grant licenses for its production by other firms.

The Maybach

Maybach has produced what is termed a transmissionless car. A six-cylinder engine, built to the same designs as the Dutch Spyker, and having a bore and stroke of 95 by 135 mm., is mounted in the usual type of chassis and drives direct by propeller shaft to a bevel type rear axle. The starting motor is sufficiently powerful to move the entire car on the level until the engine begins to fire, and this is the usual method of starting away, all the driving being done on the throttle. A planetary emergency gear is fitted, however, as well as a clutch, although it is claimed that these have only to be used for exceptionally steep hills, or when starting on hills. The rear axle is an all-aluminum structure, and the conical housing carrying the driving pinion is also aluminum. Large diameter brakes are fitted on front and rear wheels, with an adjustment for the application of the rear brakes ahead of those on the front wheels.

Brennabor is the only maker who appears to have laid out his chassis with cheap production in view. The car is a four-passenger with four-cylinder engine, 70 by 102 mm., cylinders and crankcase in one casting, two bearing crankshaft, overhead valves with push rods, three-speed transmission forming a unit with the engine, a generator-battery type of ignition, center control with left-hand steering, and cantilever suspension. This is the European type four and five-passenger economical light car which by reason of low exchange can come into direct competition on all open markets with similar productions of British, French and Italian construction.

Considered as a whole, German manufacturers have specialized in a good quality, medium price car. There



The novel double quarter-elliptic spring construction employed on the Horch chassis is said to prevent rolling and make for easy riding

has been no attempt to compete with the cheapest American types, and the Germans have avoided the French mistake of two years ago of producing mechanical masterpieces irrespective of price. Compared with France, they have made no progress on brakes and have not seriously tackled the problem of four wheel brakes. There are three or four cars in the show with brakes on all the wheels, but it is obvious from an examination that they have been produced without any important amount of practical experience behind these braking systems.

Cantilever springs in Germany are looked upon as a novelty, whereas in most other European countries this system of suspension is on the wane, for it has been found defective for really fast cars. One of the few interesting and new types of suspension is that on the Horch car. On this model use is made of double quarter-elliptics, one of the springs being ahead of the axle, with its thick end forward, and the other to the rear of the axle, with its thick end at the extremity of the frame. The two thin ends are attached by an eye bolt to a sleeve mounted with a bronze bushing on the axle housing. The advantages claimed for this type of spring are flexibility equal to that of the cantilever, reduced weight, and an absence of rolling at high speeds.

Central Drive Favored

German engineers are not at all partisans of the Hotchkiss drive, not a single car on this principle being found in the show. There is an increasing number of cars with central drive, the forward end of the propeller shaft housing either being forked or forming a sphere. This latter is a type of drive which has become particularly popular in France and Italy. Invariably, however, when this type of drive is adopted, stays are used from the extremities of the axle housing to a point on the front end of the propeller shaft housing. Benz continues to make use of tubular radius rods, although these went out of existence in other European countries several years ago. One of the exceptions to the German school is the Horch, in which a T-shape combined axle and propeller shaft housing is used, this being formed of two stampings welded together, the drive being through the spherical end of the propeller shaft housing. This exception is explained by the fact that the engineer had long experience with the Fiat Company in Italy, and has been influenced by Italian practice. On this car the differential is contained in an oil tight housing inside the axle housing, not only eliminating all possibility of leakage along the drive shafts but, it is

claimed, reducing noise by reason of this double housing.

Since pre-war days there has been a wonderful cleaning up of the details of engine and chassis. External oil pipes, straggling ignition leads, external manifolds, visible bolt heads, etc., have been removed, some of the best German constructions now approaching the clean lines for which Italian chassis are famous.

Steel Cylinder Liners Popular

Overhead valve engines and aluminum cylinders with steel liners are not in a majority, but it is evident that German engineers are working along these lines. There are some really good examples in this connection. A good example is the powerplant built in Munich by the Bayerische Motoren Werke for car assemblers. This firm made a reputation during the war on aviation engines, and since then has specialized on automobile engines. Its latest type is designated a compound motor and has cylinders and base chamber in one aluminum casting, steel liners for the cylinders, a detachable cast iron head, and four valves per cylinder inclined in the head. This being a sporting type engine, double ignition is fitted, with two magnetos driven off a cross shaft at the front. As the illustration shows, very clean lines have been obtained. A reserve oil tank is cast in the housing around the flywheel. This engine being a high efficiency type, 95 by 170 mm., with five bearing balanced crankshaft, it is intended to put it on the market with a two-speed transmission.

Horch, although exhibiting two L-head types with cast iron cylinders on an aluminum crankcase, having unit transmission, has two new all-aluminum engines ready, one with four and the other with six cylinders. These are steel lined cylinders with overhead camshaft and concealed vertical drive. Swave is another case of all-aluminum unit construction, with a detachable cast iron head and inclined valves in the head, the general lines of which can be gathered from the illustrations.

N. A. G. has a cheaper production job with detachable head, cast iron cylinders on an aluminum base chamber, and overhead valves with push rods concealed in the cylinder casting. The design is not costly and the general layout equal to that of the best to be found elsewhere. One of the features of this chassis is the direct mounting of the separate gearbox on a stiffened mud pan, instead of on the main or sub-frame. All-aluminum engines have even made their appearance for trucks, the best example being the Hille, produced in Dresden. This has aluminum cast cylinders with detachable cast iron head and overhead valves. Generator-battery ignition has not made its presence felt in Germany for, with the exception of the Dinos, controlled by Hugo Stinnes, and one or two others, the magneto is used everywhere. The reason for this is that Bosch dominates the German automobile industry, and so long as that firm adheres to the magneto, automobile manufacturers will doubtless follow suit. Bosch has produced a combined generator and magneto, but this is not a generator-battery ignition as exemplified in the Delco, but a combination of the two units which facilitates mounting. A German branch of the Delco exists, but no car was seen in Germany with Delco equipment.

Body Design

The open body dominates in Germany, with the sedan following a long way in the rear. German body designers have developed distinctively Teutonic lines. Invariably radiators are pointed, body sides are hollow, the stern generally is brought to a point, and the folding top is always concealed. All bodies are bright colored. Very frequently the top of the hood and a deep line running round the body and taking in the top housing is in a dark color with the rest of the body in a lighter tint of the same

color. There are infinite variations on these general lines, but there are no exceptions to this general type. There is a great love for beaten metal radiator shells and even engine hoods, many of these imitating beaten bronze. Fantastic designs in paneling are very common, and it would almost seem as if the body designers had sought to make automobiles which would attract attention by reason of their eccentricity. As an example there is an all-aluminum body with etched designs on it. In itself the typical German line is not displeasing, but when it is accentuated by strong contrast in panels, by abrupt angles in the fenders, and by startling colors, the result is often hideous—at any rate to any one trained to body lines as developed in all other countries of the world.

For passenger cars only clincher bead fabric tires are used. The Continental detachable rim is very extensively used, being seen more often than the detachable wheel. Steel disk wheels are not much in favor, but the steel spoke wheel is growing in popularity. Aluminum disk wheels have appeared, but are not yet employed to any great extent.

By reason of American participation in the Continental Rubber Company, giant straight side cord tires have made their appearance on the German market, and are being used for trucks and passenger-carrying sight-seeing automobiles. This is an important development for Germany, which during the war was totally deprived of rubber and a year ago had not seen a giant pneumatic tire or had any experience with straight side tires. The new tire is being used on three to five-ton trucks, both as singles and as duals. The combinations most generally seen were 40 by 8 in. dual on four and five-ton trucks and 42 by 9 in. single on three-ton trucks and sight-seeing automobiles.

Truck Industry

The German truck industry has been left free to develop on commercial lines since the war, for the army subsidy, with the military restrictions which were formerly imposed, has been abolished. As a consequence considerable improvements have been made in design, and in particular an effort has been made to reduce weight. For truck engines there is a very extensive use of overhead valves, with the camshaft in the base chamber, and with or without detachable head. The most popular type of final drive is double reduction.

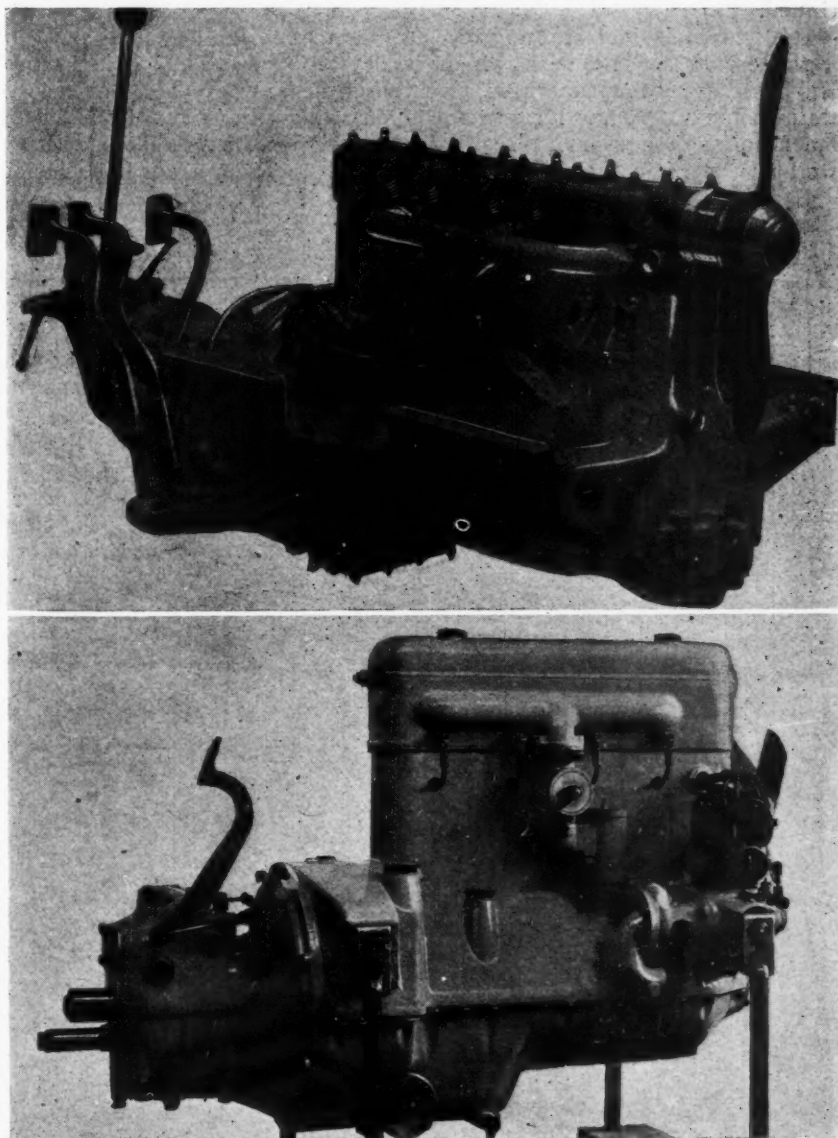
There was nothing in the German show to indicate that agricultural tractors have been adopted. It is known that Mercedes and Benz have produced this type of machine, but without any great amount of success. Speaking generally, the tractor has still to be developed in Germany.

Germany's speedway is jointly owned by the German Association of Automobile Manufacturers and the German (formerly the Imperial) Automobile Club. Its construction was begun in 1913, but all work was stopped during the war, and it was only by an effort that the track was finished in time for the first races to be held on the day the German automobile show opened.

The track has a very choice location at Grunewald, on the western end of the city of Berlin, about six or seven miles from the heart of the city, and is conveniently

reached by subway, railway and surface cars. The main entrance to the track is but a short distance from the Kaiserdamm Exhibition Hall, belonging to the German Association of Automobile Manufacturers. By reason of its location it should be an easy matter to make this track a paying proposition.

The speedway consists of two parallel tracks, with a loop at each end, running in a dead straight line through Government-owned forest land. The length of the track is 12.4 miles. On the straightaway the average width of the tracks is 33 feet, this width being increased to 70 feet on the loops. The space between the two tracks is about 25 feet. Banking on the loops is very slight, and the outer protecting wall is quite insufficient to arrest a car which has got out of control. On the straightaways there are no safety zones, and the trees which line the track constitute an additional danger in case of a burst tire or breakage of the steering gear. In its present condition the track is neither safe nor of such a nature that records can be broken on it. On the first practice day a car went over the top of the banking and during the first day's racing there were accidents of a minor nature. Material used for the surface is tar macadam. This doubtless will be satisfactory on the straightaway, but it will not stand up on the loops.



Above—The Swave aluminum overhead valve engine, a good example of modern German construction. Below—The all aluminum four-valve B. M. W. unit powerplant resembles some American powerplants in external appearance

Longer Wheelbase and Larger Engine in New Haynes

New model "75" has 132 in. wheelbase and 299 cu. in. engine with block-cast cylinders, inclined valves, chain distribution, three-piece separate head, aluminum crankcase and hollow shaft lubrication. Pump circulates water through radiator when thermostatic valve is closed.

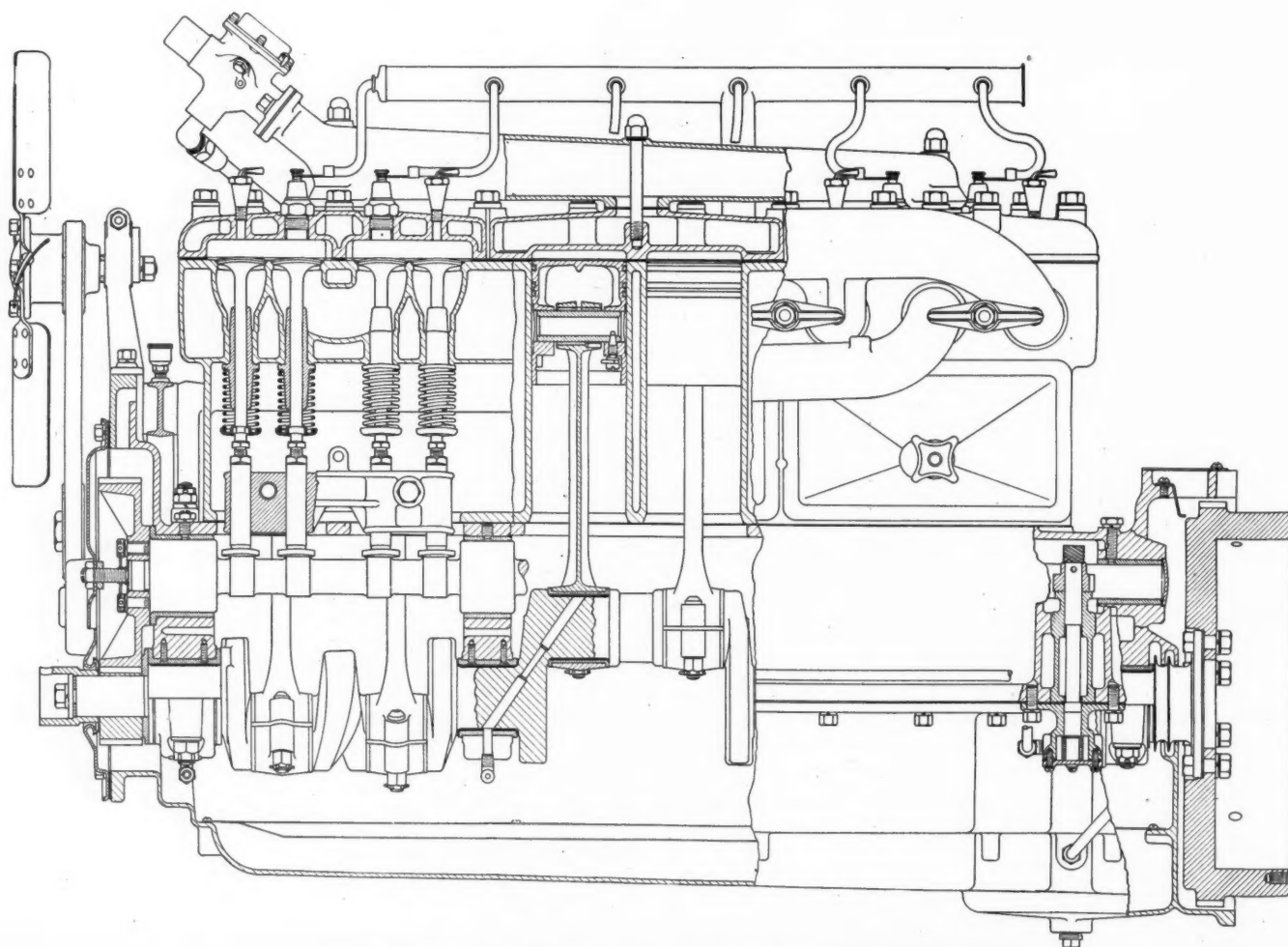
By J. Edward Schipper

THE 1922 Haynes is a newly designed car with a 132-in. wheelbase and incorporates an entirely new and more powerful engine than any of the preceding sixes. It is known as model 75. The smaller six, known as the "55," with 121-in. wheelbase, is continued.

Production is just starting on the new model, including the new engine with which it is equipped. The Haynes factory manufactures a very high percentage of its own parts. It has its own forge shop and extensive machine shop equipment so that the new engine, as well as the majority of parts which enter the car, are

produced in the one plant. The "75" chassis is a refinement of the larger type which Haynes put out last year equipped with the same engine which is now in the "55."

The new powerplant is an L-head, six-cylinder type, developing 75 b. hp. at 2600 r.p.m. It is of conventional L-head construction incorporating all of the features which characterize the later units of this type, such as inclined valves, extreme rigidity in crankshaft and crankcase construction and accessibility, particularly in the valve mechanism. One of the new features is an installation of the Link-Belt chain drive at the front



Lateral sectional view of the new Haynes $3\frac{1}{2} \times 5\frac{1}{4}$ in., six-cylinder engine.

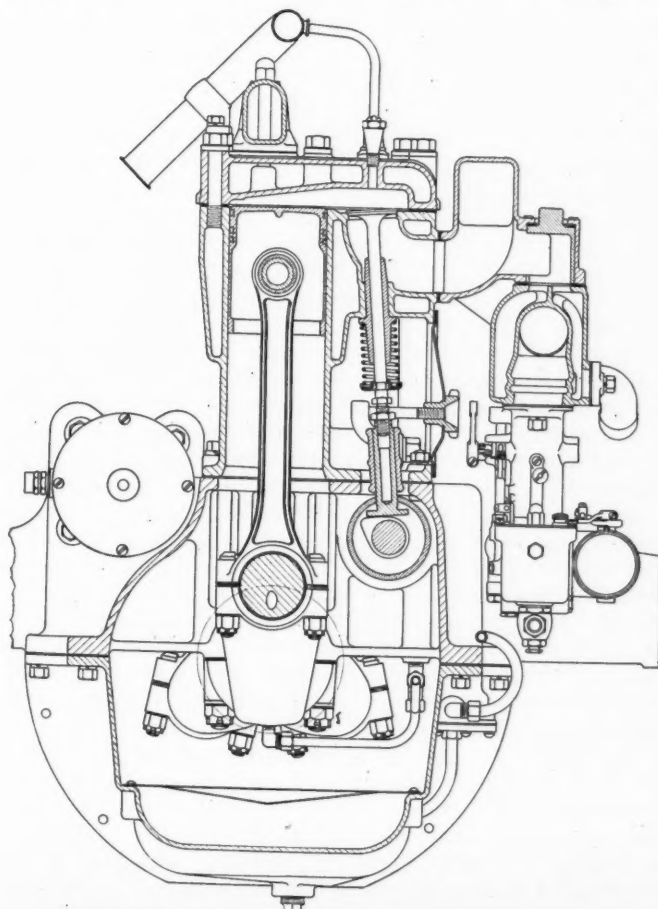
end with the new automatic spring take-up recently brought out by this concern in connection with a double-sided chain having sprocket contact on both sides.

How Operated

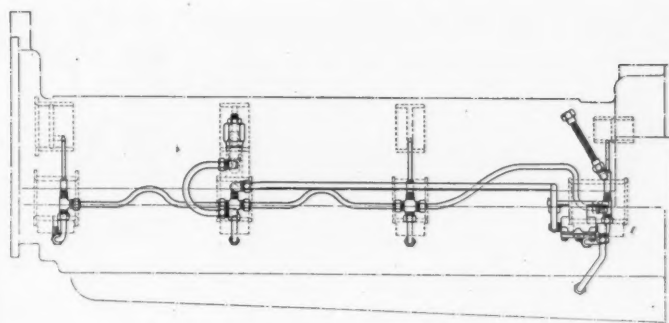
The engine is block-cast with $3\frac{1}{2}$ by $5\frac{3}{16}$ -in. cylinders, giving a displacement of 299 cu. in. The bore of the new engine is the same as that used in model 47, but the stroke is $\frac{3}{16}$ longer. The valves, which were formerly on the right, are now on the left side of the block and are inclined at an angle of 4 deg. toward the center of the cylinder. This results in a combustion chamber shape which can be readily machined out. The cylinders and water jacket are cast in one piece and the head is detachable. The head is made in three sections to allow for expansion without warping. In machining the cylinder heads, they are located from the inner surface so that the clearance in all cylinders is the same, giving uniformity in compression pressure.

The crankcase is an aluminum casting. The lower half of the case, or oil pan, is also an aluminum casting instead of the conventional stamping. The main bearings are supported in the crankcase, and six through bolts from the bearing caps pass through the case to the cylinder block, thus tying the units together and relieving the case of certain stresses which would otherwise be imposed.

The cast iron pistons are $4\frac{1}{2}$ in. in length and have three rings all located above the piston pin. The piston pin is $1\frac{1}{8}$ in. in diameter and is clamped in the piston boss by a tapered lock screw which is threaded into the bottom of the boss and is held in place by a steel locking spring which replaces the cotter pin ordinarily used for this purpose. The bearing is in the upper end of the rod, which carries a bronze bushing. The piston is



Transverse sectional view of new Haynes engine, showing inclined valves



Plan view of oil piping used in the new Haynes

grooved below the bottom ring and is drilled around the periphery with twenty $\frac{5}{32}$ in. holes. There are two grooves at the bottom of the skirt which act as oil scrapers.

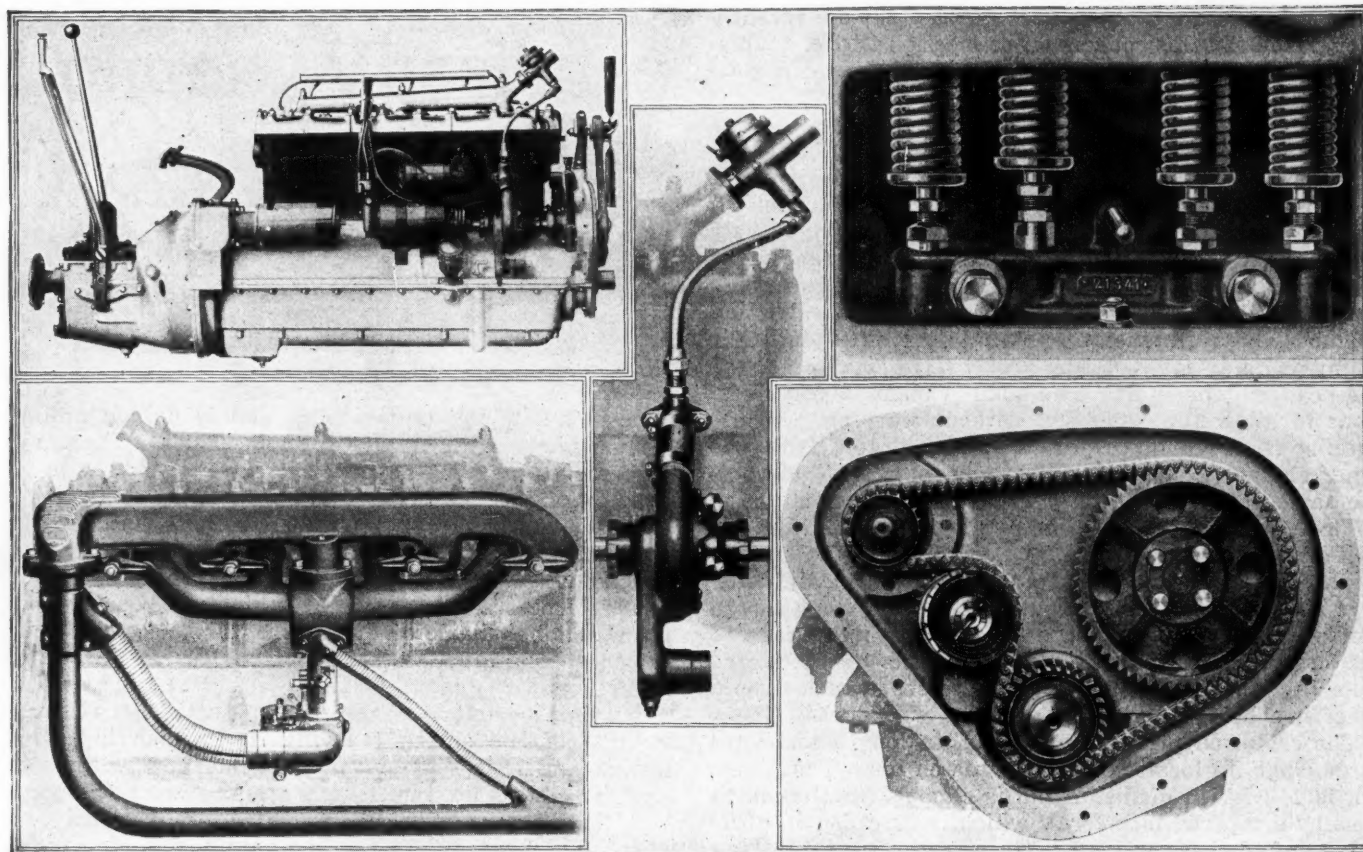
The connecting rods are of H-section flared at the lower ends. They are 11 in. in length, center to center. The big end bearings are $2\frac{1}{4}$ in. diameter by $2\frac{1}{4}$ in. in length. The crankshaft is carried in four bearings. It has a nominal diameter of $2\frac{1}{4}$ in. The lengths of the four crankshaft bearings from front to rear are, $2\frac{3}{4}$, $2\frac{1}{4}$, $2\frac{1}{4}$ and $3\frac{3}{4}$ in.

The front end drive is a triangular layout with the addition of the spring tension idler, which is placed against the back of the chain. Some of the links in the Link-Belt liner type chain are reversed to engage with this idler sprocket. The entire auxiliary drive is taken off the timing chain. The auxiliary shaft carries the fan pulley at the front end forward of the timing chain case and the water pump and generator, which incorporates the distributor, at its rear end on the other side of the timing chain case. The oil pump is driven from the camshaft. Flexibility in the drive between the water pump and the generator is secured by the insertion of a three-disk flexible coupling. By placing the distributor on the rear end of the generator, near the center of length of the engine, it is possible to minimize the length of high tension wires from distributor to plugs.

The valve followers are mushroom type and these, together with the tappet guides, are mounted in assemblies of four, held in position by two cap screws and pilot tubes for proper alignment. This gives an accessible layout for, by removing the cap screws, the entire assembly can be lifted from the engine. The engine fires 1-4-2-6-3-5, and the valve timing is such that the exhaust opens 50 deg. before lower center and closes 6 deg. after upper center. The intake opens at 8 deg. after upper center and closes 44 deg. after lower center.

The camshaft is carried in four bearings. The valves are $1\frac{1}{4}$ in. clear diameter and have $11\frac{1}{32}$ -in. lift. The exhaust valves are tulip-shape and of different composition than the intake valves, being made of an alloy which has greater heat resisting characteristics.

A pressure feed lubricating system with a maximum of 40 lb. per sq. in. pressure is used. At a running speed of 25 miles per hr. the pressure on the oil varies from 20 to 25 lb. The oil is circulated by a gear pump driven through a short vertical shaft from the rear end of the camshaft. The pump is mounted outside and on the bottom of the upper half of the crankcase. The lower pan has an external recess into which the oil pump is set. It can be removed without disturbing any of the other parts of the engine. It delivers into the main oil line inside the crankcase and leads, from this line, conduct the oil under pressure to the camshaft bearings and to an annular groove in each of the crankshaft



The new Haynes six, showing details of the vaporizing system, water pump and thermostat, valve tappet assembly and chain distribution with spiral-spring-controlled idler sprocket

main bearings. The crankshaft is drilled from each main bearing to the adjacent crankpin, the holes lining up with the oil groove, so that the connecting rod bearings are also pressure oiled.

There is a lead from the front crankshaft bearing to the timing chain idler sprocket and to the accessory shaft bearing. The idler sprocket shaft is hollow, and the oil works its way through the shaft to the sprocket, and through a hole in the sprocket on to the chain. A relief valve is fitted to prevent excess pressure at high speeds. The pistons, piston pins and valve mechanism are lubricated by oil spray thrown from the connecting rods.

The fuel is fed by vacuum from a gasoline tank, mounted on the rear of the chain to a $1\frac{1}{8}$ -in. vertical Stromberg carburetor. A number of innovations have been made in the manifolding to facilitate vaporization of the fuel. The exhaust manifold is led forward on this powerplant and cooling fins placed upon it at its forward end, where it bends downward. The center of the intake manifold is partially exhaust jacketed. Some of the exhaust gas passes through this jacket and enters the exhaust pipe at a point near the rear end of the engine. A damper, by means of which can be controlled, is provided the amount of exhaust gases which enter this jacket. In addition, all of the air which enters the carburetor is pre-heated by means of a stove clamped around the exhaust pipe at a point just below its connection with the manifold. There is a sleeve adjustment on this air intake which permits of admitting cold air at this point when desired.

The electrical equipment comprises a Leece-Neville generator and starter with a Kingston distributor for ignition and a Bendix gear for flywheel engagement. The starter is controlled by a magnetically operated switch which is controlled by contacts on the ignition

switch lever. Both the generator and starting motor are located on the right side of the engine away from the steering gear. The carburetor and manifolding are on the left side of the engine.

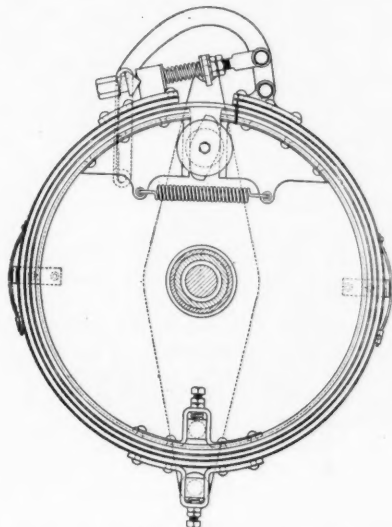
A Rayfield thermostatic control is employed on the water circulation which is by centrifugal pump. The thermostat is mounted on the water outlet above the cylinder block. The thermostat is so arranged that it permits circulation through the entire system at 140 to 150 deg. Fahr. When the engine is cold the water is circulated through the radiator and as it warms up only enough water is by-passed through the jacket to keep the engine at the desired working temperature. This differs from the practice of circulating the water through the jacket and leaving it stationary in the radiator, which is apt to cause freezing in cold weather. In this system, some thermo-syphon circulation takes place around the cylinder block before the radiator comes into action.

A 12-in. Borg & Beck clutch transmits the power to a three-speed selective gearbox manufactured at the Haynes plant. The gearbox is of conventional construction, but incorporates an air pump for the tires. The mounting of the shifter lever is so arranged that a coil spring forces a compressed felt packing against the bottom of the lever. This prevents any throwing of oil from the gearset up through the shifter lever joints into the driver's compartment.

The drive to the three-quarter floating rear axle, which is also a Haynes product, is through two universal joints. The axle is mounted on Gurney ball bearings and is equipped with spiral bevel gears. The drive is through the springs, but torque and braking reaction is taken by a torque arm, which has been added in this model. The external and internal brake has also been adopted in place of the side-by-side internal brakes

formerly employed. The brakes are 16 in. in diameter by 2½ in. in width. The tires are 34 by 4½-in. cords all around. The front axle is a conventional Elliot type and steering is by Jacox gear.

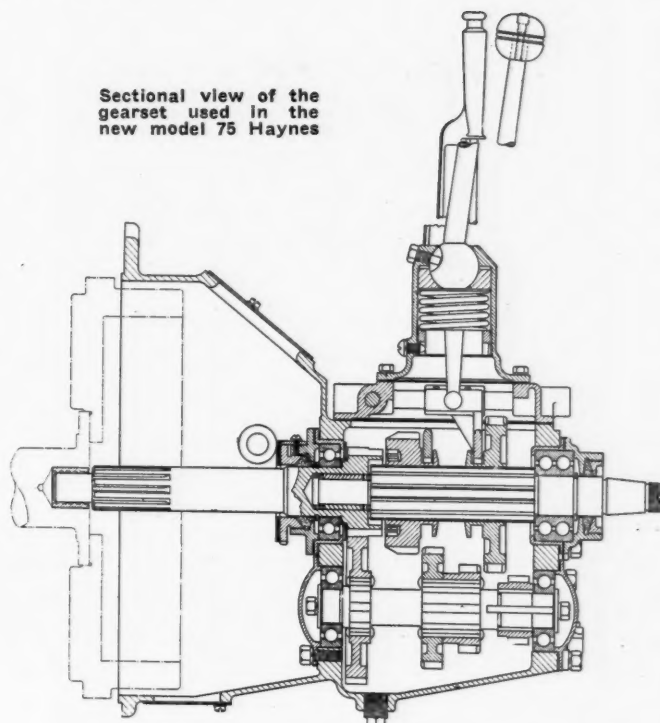
All the body types are mounted on the same 132-in. wheelbase chassis. The bodies are all made of aluminum



The new external and internal brakes, which take the place of the pair of internal, side-by-side brakes formerly used

formed over a wooden frame. The lamp equipment comprises exterior side cowl lights of a design identical with that of the headlamps. A feature in the control system is that the starting and lighting is operated from the instrument board.

The touring car, "tourister" and "speedster" model, are upholstered in genuine leather applied in front plaits over the seat springs. The brougham, sedan and



Sectional view of the gearset used in the new model 75 Haynes

suburban models are equipped with mahogany fittings, vanity cases, smoking cases, etc. There is an indirect dome light and a car heater on the closed cars. Prices on the model 75 are as follows: Seven passenger touring, \$2485; four-passenger "tourister," \$2485; two-passenger special "speedster," \$2685; five-passenger brougham, \$3185; seven-passenger sedan, \$3485; seven-passenger "suburban," \$3485.

From Passenger Coach to Truck

A FEATURE of the summer touring season in England and Scotland has been the big extension of public automobile coach services. Until a few weeks since these services had the summer touring season much to themselves, for their fares relatively were lower than the normal rail fares and the public were able to explore scenic beauties away from the railroad tracks. The competition had the effect of forcing down rail fares and leveling up competition, until now there is evidence of a shrinkage in the paying capacity of a number of auto-coach ventures.

This fact, coupled with the approaching end of the tourist season, has led the coach interests to devise means and routes to find work for the vehicles as carriers of goods. But again there are signs that the railroad interests are likely to reduce rates, even to the extent of starting a cut-rate war. Such a war is less likely to succeed now because, within a short time, British railroads will be working on the group system, as a measure of economy imposed by the Government through the Ministry of Transport. It follows that if the railroads cannot cut rates among themselves to compete for local traffic when the localities are served by two or more rival companies, they are unlikely to cut rates against automobile traffic to the limit possible if each company were fighting its own battle against all comers. What is more likely, however, is that the railroads themselves will start automobile service ostensibly for collecting and delivering rail borne traffic, the cost being included in a through terminal rate. At present much commercial vehicle traffic is really rail consigned.

However, the interests concerned are alive to the situation and scores of automobiles are being prepared for a

winter's use as merchandise carriers. The tactics of the railroad interests also are being adopted as regards organization and co-operation, through rates and standard changes and clearing house facilities, which include provision for insuring full or at least a paying return journey. Altogether things look like being lively in traffic affairs during the next few months, provided there is an improvement in trade. It may be added that the trend toward using smaller capacity and air-tired coaches offers a better prospect for the automobile carriers than would have been the case last year.

New York Electrical Show

THE New York Electrical Show, which closed Oct. 8, had on display a number of electric trucks, and the manufacturers exhibiting them reported gratifying results. There was not an enormous number of sales made at the show, but the various exhibitors said they had entertained many prospective buyers and felt that the results would be felt in due time. The Walter Motor Truck Corporation of New York made the largest number of sales during the show, disposing of twelve trucks. The locking differential and other new features attracted buyers who said they were users of the gasoline truck but were anxious to give the electrics a trial.

The Commercial Truck Co. of Philadelphia made two sales, and the Landsden Co. of Danbury, Conn., made one.

Next year's exhibit will be held in the Grand Central Palace, it was announced.

The Testing of Motor Fuels

Part II*

In Part I of this manual the need for careful tests of motor fuel and interpretation of results of tests were covered. Part II describes in detail the apparatus required and the methods to be followed in the tests.

1—Specific Gravity

THE apparatus for determining the gravity of gasoline may be a Westphal balance (Fig. 7) or an accurate hydrometer of the long stem type (Fig. 10) graduated from 0.700 to 0.800 at 60 deg. Fahr. (15.5 deg. C.). If benzol mixtures are met with, a hydrometer having a scale graduated from 0.800 to 0.900 is also necessary.

Care should be taken that the gravity determination is made at 60 deg. Fahr. (15.5 deg. C.).

2—Distillation Range**

The equipment required consists of the layout shown in Fig. 8 made up of

Standard 100 cc. Engler Flask for oil distillation made of Pyrex glass to dimensions given in Fig. 9.

Suitable support with $\frac{1}{8}$ in. to $\frac{3}{16}$ in. thickness of asbestos 6 in. square having an opening $1\frac{1}{4}$ in. in diameter. Only this limited portion of flask is to be heated. Wire gauze must not be used.

Thermometer of selected enamel backed tubing, as described below under Apparatus Specification.

Condenser. The dimensions and construction to conform to standards as described below under Apparatus Specification.

Graduate. 100 cc. glass graduated cylinder. See Apparatus Specification.

Source of heat may be a gas burner, alcohol lamp, or electric heater.

Procedure and Details of Manipulation in Conduction of Distillation

1—The condenser trough is filled with water containing a liberal portion of cracked ice. The temperature should not be lower than 32 deg. Fahr. nor above 40 deg. Fahr. (0 deg.-5 deg. C.). The condenser tube is swabbed to remove any liquid remaining from a previous distillation.

2—One hundred c.c. of gasoline is measured, at a temperature of 60 deg. Fahr. (15.5 deg. C.) into a clean, dry Engler flask from a 100-c.c. graduate. The same graduate is used as a receiver for distillates without any drying. This procedure eliminates errors from an apparent distillation loss due to the impossibility of draining the gasoline entirely from the graduate.

3—The same graduate is placed under the lower end of the condenser tube so that the latter extends downward below the top of the graduate at least 1 inch. If the room temperature be above 80 deg. Fahr. (27 deg. C.), the receiving graduate shall be placed in a bath maintained at a temperature not less

than 65 deg. Fahr. (18 deg. C.) nor more than 75 deg. Fahr. (24 deg. C.). The condenser tube shall be so shaped and bent that the tip can touch the wall of the graduate on the side adjacent to the condenser box. This detail permits distillates to run down the side of the graduate and avoids disturbance of the meniscus caused by the falling of drops. The top of the graduate is covered, preferably by several thicknesses of filter paper or blotting paper, the condenser tube passing through a snugly fitting opening. This minimizes losses due to circulation of air through the graduate and also excludes any water that may run down the outside of the condenser tube on account of condensation on the ice-cooled condenser box.

4—A boiling stone, a piece of unglazed porcelain or other similar material not exceeding one-fourth inch in any dimension, is dropped into the gasoline in the Engler flask. The thermometer is equipped with a well-fitted cork and its bulb covered with a thin film of absorbent cotton (preferably the long-fibered variety used for surgical dressing). The quantity of cotton used shall be not less than 0.005 nor more than 0.010 gram (5 to 10 milligrams). The thermometer is fitted into the flask with the top of the bulb just below the lower level of the side neck opening. The flask is connected with the condenser tube by means of a well-fitted cork or stuffing box. The vapor tube must extend at least $1\frac{1}{4}$ inches into the condenser tube.

5—Heat must be so applied that the first drop of the gasoline falls from the end of the condenser tube in not less than five nor more than ten minutes. The initial boiling point is the temperature shown by the thermometer when the first drop falls from the end of the condenser tube into the graduate. The amount of heat is then increased so that the distillation proceeds at a rate of from 4 c.c. to 5 c.c. per minute, which is approximately two drops a second. The graduate is moved occasionally in order to permit the operator to ascertain whether the speed of distillation is right as indicated by the rate at which the drops fall. The thermometer is read as each of the selected percentage marks is reached. The maximum boiling point or end point is determined by continuing the heating until the column of mercury reaches a maximum and then starts to recede consistently.

6—Distillation loss is determined as follows: The condenser tube is allowed to drain for at least five minutes after heat is shut off and then a final reading taken of the quantity of distillate collected in the receiving graduate. The distillation flask is removed from the condenser and thoroughly cooled as soon as it can be handled. The condensed residue is poured into a small graduate or graduated test tube and its volume noted. The sum of this volume and the volume collected in the receiving graduate subtracted from 100 c.c. gives the figure for distillation loss.

3—Acidity†

The cooled residue from the distillation flask is collected in a test tube and its volume noted. Three volumes of distilled water are then added and the tube is shaken thoroughly. The mixture is allowed to separate and the aqueous layer is removed to a clean test tube by means of a pipette and one drop of a 1 per cent solution of methyl orange in distilled water is added. No pink or red color should be formed.

*This manual was prepared by the General Motors Research Corporation and edited by T. A. Boyd of the Fuel Section of that organization.

**The apparatus specified and the procedure to be followed in this test is adapted from "Report of Committee on Standardization of Petroleum Specifications." Bulletin 5 of the U. S. Bureau of Mines.

†Method recommended by Committee on Standardization of Petroleum Specifications.

4—Percentage of Unsaturation

The most convenient form of apparatus for use in this test and one which gives sufficient accuracy for commercial work is the ordinary 10 cc. graduated cylinder with ground glass stopper (Fig. 12).

Exactly 5 c.c. of the gasoline is put into the graduated cylinder by adjusting the level so that the bottom of the meniscus is just even with the 5 c.c. mark after the gasoline has been well shaken in the cylinder with the stopper closed and has been allowed to come to rest.

The cylinder and gasoline should then be thoroughly cooled in ice water; after which slightly less than 5 c.c. of sulphuric acid (specific gravity 1.84) is poured into it, care being taken that the acid does not splash onto the surface of the gasoline but runs quietly down the side of the cylinder. After securely replacing the stopper and thoroughly cooling the graduate and contents in ice water, the acid should be brought into more intimate contact with the gasoline, first, by rotating the graduate in a nearly horizontal position. If no appreciable heat develops in this way, the acid may then be thoroughly mixed with the gasoline by a vigorous endwise shaking. This shaking should be continued intermittently for several minutes and between the periods of agitation the graduate should be cooled in ice water to prevent loss of gasoline. After allowing the cylinder to stand for several hours, preferably over night, the absorption is read directly.

5—Content of Gummy Materials (Corrosion Test)

A freshly polished hemispherical dish of spun copper, approximately $3\frac{1}{2}$ in. in diameter is required.

Pour into the dish 100 c.c. of the gasoline to be examined, and place the dish in an opening of an actively boiling steam bath so that the steam comes in contact with the outer surface of the dish up to the level of the gasoline. If a steam bath is not available a 500 or 600 c.c. glass beaker half filled with water will serve the purpose. The water should, of course, not be heated with an open flame, because of the danger of fire from the vaporized gasoline, but either an open steam line or an electric hot plate should be used. Allow the dish to remain on the steam bath until all volatile portions have disappeared. Then note—

1—Whether there is a visible amount of gum deposited in the dish. The weight of this gum may be determined if the empty dish has been accurately weighed at the beginning of the test. The dish should be cooled and thoroughly dried before it is weighed.

2—Whether the bottom of the dish is colored gray or black.

6—Content of Aromatic. Hydrocarbons (Benzol, Etc.)

Detection of Presence in a Gasoline: The presence of benzol in a gasoline can usually be determined from the relation between its specific gravity and distillation data, as outlined under the corresponding heads in Interpretation of Results given in Part I. The following method is given for the determination of the amount of benzol in a fuel.

Determination of the amount of aromatics present—The method which is given here for the quantitative determination of benzol and similar hydrocarbons in gasoline has been worked out at the General Motors Laboratory. It is based on the reaction between nitric acid and aromatic hydrocarbons to form nitrobenzene (oil of mirbane), nitrotoluene, etc. The nitrating mixture has no action on the paraffin or naphthene hydrocarbons in the cold. The method is fairly rapid and is sufficiently accurate for commercial work. Because of the nature of this process it should not be attempted by anyone unless he has had some experience with chemical reactions. This is because of the very strong and highly corrosive mixture of acids which it is necessary to use, and because the rate of the reaction must be controlled in order to prevent the danger resulting from the development of too much heat.

Apparatus—Westphal balance, or accurate hydrometer as above (Figs. 7 and 10); 500 c.c. round bottom flask with long neck (Fig. 14); 500 c.c. separatory funnel with ground glass

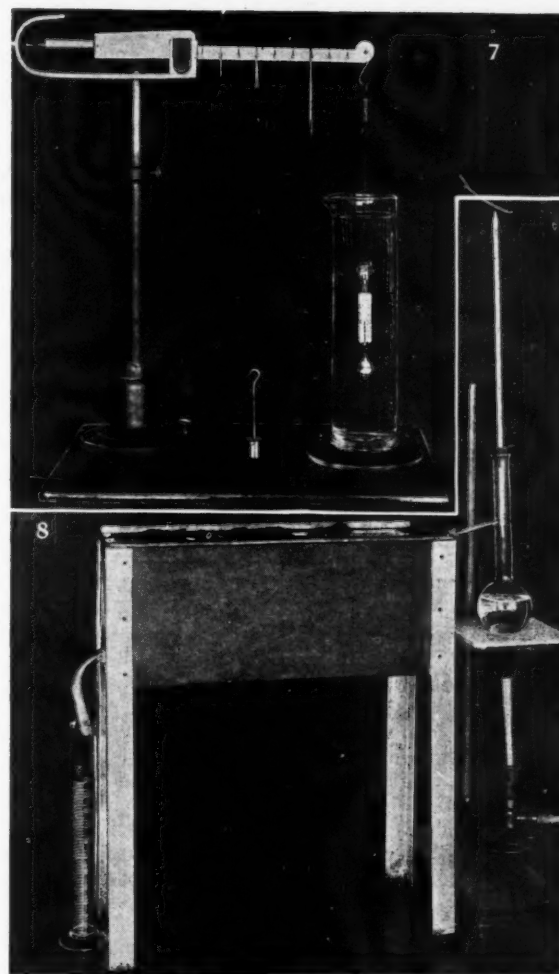


Fig. 7—Above: The Westphal Balance used for accurate determination of specific gravity. Fig. 8—Below: Standard Engler distillation apparatus, showing arrangement of flask, condenser, etc.

stopper (Fig. 15); glass filter funnel, about 2 in. in diameter.

Reagents—A nitrating mixture composed of acids in the ratio of

150 g. sulphuric acid (sp. gr. 1.84)

100 g. nitric acid (sp. gr. 1.42)

Solution of sodium hydroxide (30 per cent sodium hydroxide in distilled water)

Fused calcium chloride.

Method—1—Determine accurately the specific gravity of the fuel at 60 deg. Fahr. If the percentage of unsaturated hydrocarbons as previously determined exceeds 5, the fuel should be cooled in ice water and thoroughly washed with sulphuric acid (sp. gr. 1.84), the acid completely removed by washing with water, with a dilute solution of sodium hydroxide, and with water again, and the resulting gasoline dried with fused calcium chloride before the specific gravity is determined.

2—Place about 200 c.c. of the fuel in a 500-c.c. round bottom flask with a long neck. If the percentage of benzol in the blend is over 50, as indicated by its specific gravity and distillation data, it should be diluted with a measured amount of gasoline which is known to contain practically no aromatics and which has previously been thoroughly washed in the cold with sulphuric acid (sp. gr. 1.84) so that the final percentage of benzol is from 30 to 40. The specific gravity of this mixture should be determined and the value used in the calculation of the percentage of benzol in the original fuel as given below. After thoroughly cooling the flask and contents in ice water about 50 c.c. of the nitrating mixture is added to it, being careful to add it in such a way that it does not splash onto the surface of the fuel, but runs down the side of the flask. The flask is closed by a rubber stopper into which is inserted a piece of capillary or small bore glass tubing which extends about a foot above the stopper. After the flask with

its contents has been again cooled in ice water, it is removed and the fuel and nitrating mixture are mixed by a gently endwise shaking. A large amount of heat is generated by the reaction which is thus induced, and care must be taken that the temperature of the nitrating mixture does not rise above 40 deg. C. (104 deg. Fahr.). The temperature of the reacting mixture must be kept low by means of the cooling bath, both to prevent loss of the low boiling constituents of the gasoline and to prevent the reaction between the nitric acid and the benzol from accelerating to a dangerous velocity.

As soon as this portion of nitrating mixture loses its strength, which it does after three or four alternate periods of agitation and cooling, the contents of the flask is removed to a separatory funnel and the acid separated from it. The gasoline layer is then returned to the flask, another portion of nitrating mixture is added to it, and the operation as just described is repeated. After this has been done a few times, three layers will form in the separatory funnel, only the upper of which is retained. The middle layer is a solution of nitrated benzene in gasoline, and the gasoline can be separated from it only with difficulty. In order to prevent this layer from containing so much of the gasoline that an insufficient amount is recovered in the upper layer, the percentage of aromatics in a fuel to be examined by nitration must be kept below 50, by dilution with gasoline if necessary, as described above. When an intermediate layer no longer forms and the nitrating mixture after thorough agitation with the fuel remains colorless or assumes only a faint yellow color, the nitration may be assumed to be complete.

The nitrating mixture is separated and the gasoline layer is washed several times with sulphuric acid (sp. gr. 1.84). This washing is best conducted in a separatory funnel by agitating the gasoline with several successive small portions of sulphuric acid, separating the acid after each wash, and continuing the operation until the acid layer becomes only very slightly yellow. After washing once with water the gasoline is washed with small portions of a 30 per cent solution of sodium hydroxide until a yellow color is no longer imparted to the sodium hydroxide solution. Finally the gasoline is washed two or three times with water, and dried by filtering through a small amount of fused calcium chloride placed in a filter paper.

3—The specific gravity of the gasoline so obtained is accurately taken at 60 deg. Fahr. (15.5 deg. C.).

4—The percentage of aromatic hydrocarbons present in the original fuel is calculated as follows: (An increase in volume occurs when aromatic and paraffin hydrocarbons are mixed. However, it is not large enough to seriously affect the accuracy of this method from a commercial standpoint.)

0.879 (sp. gr. motor benzol)—Sp. gr. gasoline after nitration = A

Sp. gr. of fuel under analysis (see note)—Sp. gr. of gasoline after nitration = B

$\frac{B}{A} \times 100 = \text{percentage of aromatics (benzol)}$

Note: If the percentage of unsaturation of the fuel exceeds five, and it has been washed with sulphuric acid before nitration, as is recommended above, the specific gravity used here should be that of the fuel after the sulphuric acid treatment. (See above.)

Thus, if
Specific gravity of fuel under analysis is 0.789
Specific gravity of gasoline after nitration is 0.740
 $0.879 - 0.740 = 0.139$
 $0.789 - 0.740 = 0.049$

$\frac{0.139}{0.049} \times 100 = 35 \text{ per cent benzol}$

7—Purity of a Fuel As To Its Content of Paraffin Hydrocarbons

This test* is conducted as described below, using the fuel after the unsaturated and aromatic hydrocarbons have been removed by nitration and washing as de-

scribed under the head, Methods for Determining the Content of Aromatic Hydrocarbons.

Apparatus—Thermometer with scale graduated by tenths of a degree from 0 deg. to 100 deg. C.

Test tube (6 in. x ½ in.).

150-c.c. glass beaker.

2 one cubic centimeter pipettes graduated to tenths of a cubic centimeter.

Flask and separatory funnel as given above under the head Methods for Determining Aromatics.

Reagents—Nitrating mixture composed of acids in ratio of 100 grams sulphuric acid (sp. gr. 1.84).

30 grams fuming nitric acid.

30 per cent solution of sodium hydroxide in water.

Aniline. The aniline should be freshly freed from water and decolorized by distilling from a larger quantity using direct heat, instead of steam for the distillation, and collecting the aniline for use as reagent while a thermometer in the vapor shows it to be distilling at about 183 deg. C. When exposed to light and air, aniline gradually darkens until it finally becomes black. Aniline light in color may be prepared from the dark material by distilling as described above.

Method—The fuel after nitration and washing for the determination of aromatic hydrocarbons as described above is treated at ordinary temperatures with two or three small portions of the nitrating mixture containing fuming nitric acid. It is then thoroughly washed with sulphuric acid, water, sodium hydroxide, water, and dried as described under Method for Determining Content of Aromatic Hydrocarbons. The fuel so obtained is used in this test.

An ordinary 6 in. x ½ in. test tube is fitted with a one-hole stopper and a thermometer so adjusted through the stopper that the bulb will be about 1/16 in. from the bottom of the test tube. From a 1-c.c. pipette, graduated to tenths of cubic centimeters, a sufficient amount of aniline is run into the test tube to cover one-half of the bulb of the thermometer.† An amount of the fuel under test equal to the amount of aniline used should then be added to the test tube. The total volume should be such that the bulb of the thermometer is completely covered. The stopper holding the thermometer is then put into the test tube and the whole placed in a beaker of clean distilled water over a gas flame, or on an electric hot plate.

The water should be stirred and heated slowly to such a temperature that the layers of aniline and fuel become completely miscible and perfectly clear. To aid in this the test tube should be frequently and gently shaken in an endwise direction. The beaker is then removed from the flame and the water stirred with the test tube using both a rotary and an endwise motion. As the water cools slowly a point will be reached at which a distinct and almost opaque cloudiness will appear in the test tube. At this point the temperature is quickly read to 0.1 degree accuracy, the tube being kept in the water all the time. An amount of gasoline equal to 1/5 of the original portion used is then added to the test tube and the determination of the dissolution temperature repeated as above. If the temperature at which the turbidity appears rises or falls more than 0.2 of a degree, the critical range has not been found. Aniline or gasoline is added to the mixture until the critical range is obtained. The highest dissolution temperature in this range is the Temperature of Critical Dissolution (T. C. D.) of aniline and the gasoline.

The highest temperature thus obtained (the T. C. D.) seldom varies more than 1 deg. C. from the Temperature of Dissolution (T. D.) of a 50 per cent aniline + 50 per cent gasoline solution. So that, unless a high degree of accuracy is desired, the work can be greatly facilitated by determining only the T. D. of a 50-50 aniline-gasoline solution, and using this value instead of the more accurate T. C. D.

If the T. C. D. of the gasoline is above its initial boiling point, as it usually is and as may be recognized by the gasoline in the tube beginning to boil before the solution of the aniline in it is affected, it is necessary to observe the following precautions:

1—A one-hole rubber stopper should be used for closing the test tube and holding the thermometer.

2—Care should be taken to heat the water to a temperature no higher than is necessary for the solution of the aniline in the gasoline.

*The test described herein is based on the work of Chavanne, Simon and Dort, Comptes rendus, Vol. 168, pages 1111-4 (1919) and is supplemented with results of the experience of this Laboratory.

†The aniline pipette—which should be used only for aniline during the procedure—is conveniently kept through a hole made in the cork of the aniline bottle. In order to prevent contact of the aniline with air when not in use, the pipette itself should be stoppered with a small bit of cork.

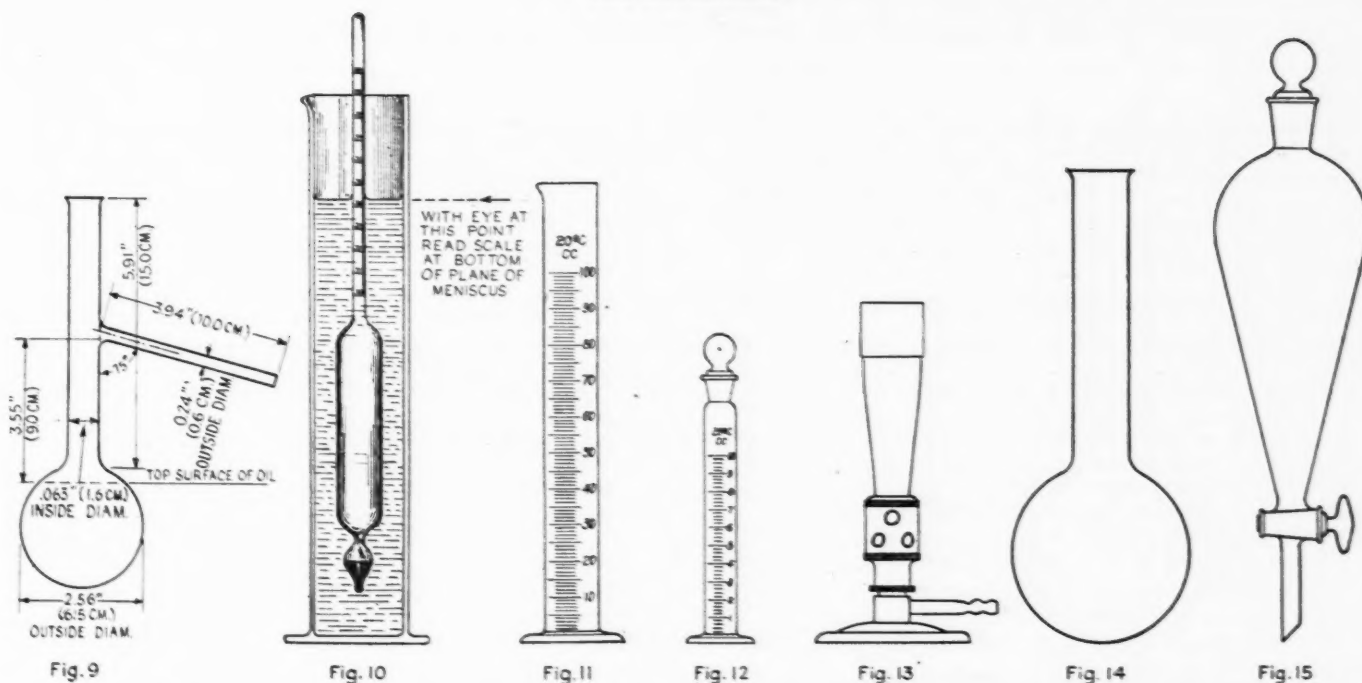


Fig. 9—Standard 100 c.c. Engler Flask. Fig. 10—Long stem hydrometer, showing method of reading. Fig. 11—100 c.c. graduate. Fig. 12—10 c.c. glass stoppered graduated cylinder. Fig. 13—Meker Burner. Fig. 14—500 c.c. round bottom flask. Fig. 15—500 c.c. separatory funnel

3—Before opening the tube for the addition of more of the constituents the test tube should be cooled under the tap in order to prevent loss of gasoline as vapor.

4—If the gasoline has a very low initial, such as might be given by a casinghead blend, and boils in the test tube, it is best to place the entire sample in a clean distilling flask and distill until the vapor coming off has a temperature of about 60 deg. C. (140 deg. Fahr.). The residue in the flask may then be used in the T. C. D. determination.

If a highly accurate value for the T. C. D. of a very volatile gasoline is desired, it is necessary to make the determination in sealed glass tubes. For this purpose aniline and gasoline in varying proportions around the critical range suspected are placed in small glass tubes sealed at one end and having a constriction in the other end. These tubes are placed in a freezing mixture and sealed off at the constriction. Each in turn is then secured to the thermometer by rubber bands and the T. C. D. determined as above, using gentle endwise shaking and vertical stirring of the heating bath.

A determination made on an untreated gasoline gave this result.

C.c. Aniline	C.c. Gasoline	Temperature of Dissolution, Deg. C.
1.0	1.0	42.7
1.0	1.2	42.0
1.4	1.2	43.0
1.6	1.2	43.0 T. C. D.
1.8	1.2	42.4

8—Content of Alcohol

Because of the very great solubility of alcohol in water and the fact that it will not dissolve in gasoline alone if water is present, the detection and determination of alcohol in gasoline or gasoline-benzol blends is simple.

A 10 cubic centimeter graduated and glass stoppered cylinder (Fig. 12) is required. The determination is made in the same way as the percentage of unsaturation in gasoline as described above, except that water is used instead of sulphuric acid and that cooling is unnecessary. The amount of alcohol is read directly by the decrease in the volume of the gasoline layer.

Specifications of Apparatus

Important—In order to obtain test results that are comparable with other laboratories, it is necessary to

use apparatus of the correct design. The following specifications cover such apparatus, and are standard as the equipment used for testing gasoline.

Westphal Balance—Shown in Fig. 7. To be accurate to the fourth decimal.

Hydrometer—Fig. 10. To be of the long stem type. Scale to be graduated from 0.700 to 0.800 at 60 deg. Fahr. (15.5 deg. C.). For benzol mixtures, scale to be graduated from 0.800 to 0.900 at 60 deg. Fahr. (15.5 deg. C.).

Engler Flask 100 cc.—Fig. 9. The prescribed dimensions are considered essential to attaining uniformity of results.

Dimensions as follows:	Centimeters	Inches
Outside diameter of bulb...	6.5 + or — .10	2.56 + or — .04
Inside diameter of neck...	1.6 + or — .05	.63 + or — .02
Length of neck	15.0 + or — .20	5.91 + or — .08
Length of vapor tube.....	10.0 + or — .20	3.94 + or — .08
Outside diameter of vapor tube .....	.6 + or — .05	.24 + or — .02

Position of vapor tube 9 cm. (3.55 inches) above surface of the gasoline when flask contains its charge of 100 c.c. The tube is approximately in the middle of the neck and is set at an angle of 75 deg. from the perpendicular. For safety, gasoline should be distilled only in a flask made from "Pyrex" glass.

Thermometer—The thermometer shall be made of selected enamel-backed tubing, having a diameter between 5.5 and 7 mm. The bulb shall be of Jena normal or Corning normal glass; its diameter shall be less than that of the stem and its length between 10 and 15 mm. The range shall cover 0 deg. C. (32 deg. Fahr.) to 270 deg. C. (518 deg. Fahr.) with the length of the graduated portion between the limits of 210 to 250 mm. The point marking a temperature of 35 deg. C. (95 deg. Fahr.) shall not be less than 110 mm. nor more than 135 mm. from the bottom of the bulb.

When the thermometer is made according to the Centigrade scale it shall be graduated in 1 deg. intervals. Each tenth degree shall be numbered and each fifth degree shall be distinguished by a longer mark. When made according to the Fahrenheit scale, it shall be graduated in 2 degree intervals, each

List of Apparatus and Reagents Required for Testing Gasoline

	Approximate Cost		Approximate Cost
1 Electric heater for gasoline distillation	\$19.25	2 500-c.c. separatory funnels with glass stoppers..	3.76
1 Westphal balance	29.70	2 2-in. filter funnels .....	.44
2 Standard Engler distillation flasks	1.32	1 pkg. (100 sheets) 4-in. filter paper .....	.20
1 Standard condenser for distilling petroleum oils.	31.90	144 Corks for assembling distillation apparatus...	1.50
2 Gasoline thermometers	11.00	1 set cork borers	1.25
1 Thermometer, 0-100 deg. C. by tenths.....	7.15	1 pkg. cotton for thermometer bulbs .....	.15
2 100-c.c. graduates .....	.89	9 lb. sulphuric acid	1.87
1 Meker burner	2.64	8 lb. nitrating mixture, made with 1.42 nitric acid.	1.90
1 Burner connection, flexible metallic .....	.30	4 lb. nitrating mixture, made with fuming nitric acid	1.40
1 Ring stand, 5-in. ring, and 5-in. table ring.....	1.76	2 liters 30 per cent solution sodium hydroxide....	1.08
1 Burette clamp .....	.44	1 lb. fused calcium chloride .....	.80
6 Test tubes, 6 in. x 1/2 in.....	.66	1 lb. Aniline .....	.55
2 1-c.c. pipettes, graduated by tenths .....	.46	200 c.c. 1 per cent solution of methyl orange.....	.28
4 10-c.c. glass stoppered graduated cylinders.....	2.55	1 Asbestos board for gasoline distillation, 6 x 6 x 1/2 in. with 1 1/4 in. dia. hole .....	.15
2 Pans for ice water baths	2.20	1 lb. rubber stoppers	1.65
2 3 1/2" hemispherical copper dishes	1.98		
2 500-c.c. round bottom long neck flasks equipped with stoppers for nitration .....	.88		
2 Suberite rings for 500-c.c. flasks	1.43		
2 500-c.c. beakers .....	.55		
		Approximate cost of total kit	\$125.00

twentieth degree being numbered and each tenth degree being distinguished by a larger mark.

The scale shall be graduated for total immersion. The accuracy shall be within about 0.5 deg. C. (1.0 Fahr.). The space above the meniscus shall be filled with an inert gas, such as nitrogen, and the stem and bulb shall be thoroughly aged and annealed before being graduated. All materials and workmanship shall be the best.

Condenser—Fig. 8. The condenser shall consist of a thin-walled tube of brass or copper 1/2 in. internal diameter and 22 in. long. It shall be set at an angle of 75 deg. from the perpendicular and shall be surrounded with a cooling jacket of the trough type. The lower end of the condenser shall be cut off at an acute angle and shall be curved down for a length of 3 in. The condenser jacket shall be 15 in. long.

Graduate—Fig. 11. The graduate shall be of the

usual type, with a pressed or molded base and a lipped top. The graduated portion shall be for the quantity of 100 cc. It shall be numbered from the bottom up at intervals of 10 cc. Markings shall be for single cubic centimeters, and each fifth mark shall be distinguished by a longer line. The length of the graduated portion shall be not less than 7 in. nor more than 8 in. The distance from the upper graduated mark to the rim shall be not less than 1 1/4 in. nor more than 1 3/4 in.

Heater—If a gas burner is used it should be preferably of the Meker type, Fig. 13. Electric heaters especially designed for the distillation of gasoline may be readily obtained from reputable chemical supply houses.

Graduated cylinder with ground glass stopper—Fig. 12. 10 cc.

Polished hemispherical dish of spun copper approximately 3 1/2 in. diameter.

N. I. V. A. Discusses Difficulties of Farm Implement Industry

(Continued from page 754)

because some makers find a demand for it, but the question is if it would not be much better to eliminate it. The cost of carrying it is believed to be greater than the profits that come from its sales.

While the question of the farm implement dealer was not a subject discussed at the convention it came to the surface on one or two occasions. It was stated by one speaker that power farm equipment includes motor cars, motor trucks, isolated house lighting plants, as well as tractors and stationary gas engines and all that goes therewith. The natural conclusion was that the dealer selling all of this equipment was the logical farm equipment dealer; in a word, this is the type of dealer to sell to 40 per cent of the population of the country. For years our publications, *Motor World* and *Motor Age*, have been urging on the dealer the value of selling tractors and the other equipment that goes therewith. To-day some of the implement makers are approaching this from the other end of the line by including motor cars, trucks and isolated house lighting in the classification of power equipment for the farm, and at the same time are aiming to develop the power equipment dealer.

This dealer question is one that will be very much on the surface in the next few years and in reducing the

cost of all automotive products to the consumer we should keep in mind that of merchandising by not burdening our rural communities with several classifications of dealers, one for cars, one for trucks, one for tractors, one for house lighting, but rather follow the trend of big consolidations in the steel industry, in the meat packing industry, in finance, in publication work, etc. The cost of our apparatus to the consumer will be reduced by such consolidations and in so doing we are lowering walls of sales resistance and making it easier to own, operate and maintain our equipment, whether motor cars, trucks, tractors, house lighting, etc. Let us remember that new conditions make new methods necessary. For the new wine new bottles are essential. The old order of a score of years ago is passing and to succeed we must correctly interpret the needs of to-day. The situation calls for analysis rather than post mortems.

PUBLIC motor services in France are encouraged by Government bonuses. Thus the Minister of Public Works recently has granted Government subventions to lines in the Departments of Herault, Drome, Loire, Yonne, Correze, Doube, Ardeche, Cantal, Saone-et-Loire and Eastern Pyrenees.

The Application and Manufacture of Silent Chain

A description of recent developments in applying chain to front end or distribution drives. Operation of automatic tension idler is explained. The manufacture of chain parts, their assembly and inspection, is outlined.

By J. Edward Schipper

MUCH has been learned during the past three years on front end chain drive installation for automobile engines. From all indications there will be more chain-driven front ends in the near future than we have at present, as there is a decided drift in that direction. It has been pointed out recently through these columns that practically all of the installations made on high-priced cars brought out during the past two years have been silent chain drive, and while it is admitted by car manufacturers and chain makers alike that perfection has not as yet been attained, there have been some distinct improvements which have been due not only to improvements in the design of the chain itself, but even more to the knowledge of how to install the chain and how to manufacture it.

Some of the installations which have been made recently are more or less revolutionary from a front end drive standpoint. The double-sided chain, automatic spring tension device and some new methods of making adjustments with the triangular layout are examples. These new types of installation give the designer a choice which enables him to suit any condition of auxiliary drive he is likely to encounter.

Chain life in the front end drive of an engine would be immeasurably increased if the high, momentary stresses could be eliminated. However, it is seemingly impossible to separate this condition of high momentary stress from internal combustion engine design as we now have it. With this condition prevailing, high factors of safety and accuracy are necessary. Where the accuracy of manufacture comes in, is not only to secure the proper spacing of the links and the proper action of individual links, but also to keep the contact line or the line of stress directly across the chain. An inaccurate chain will squirm, because the line of stress moves about, with a result that it is noisy and short lived.

There are certain inherent advantages to a chain drive which can be fully realized if the chain is accurately

manufactured and properly designed and installed. In the first place, quietness is readily secured in this type of installation, when the proper type of installation is selected. Probably the greatest advantage of chain drive, however, is the introduction of an elastic element into the drive which absorbs vibration that a positive drive would transfer to the housing. To put this in another way, a great many of the timing gear noises which are charged up to the front end drive are simply transferred to this drive from other parts of the motor and do not originate in the timing gearcase at all. This condition is not so apt to prevail with an elastic type of drive such as the chain.

Another definite advantage is the ease of overhauling and restoring the front end drive to its exact original condition. Adjustability in a chain drive is, of course, highly essential, and engineers should not countenance a design in which there is not an adjustment feature of some sort to take up initial stress and wear.

The qualities necessary to accomplish the results outlined in these requirements must be built into the chain if good results are to be obtained. These are the basic requirements of chain design and form the fundamentals which have been considered in the working out of the chain types. The Link-Belt chain with which this article is concerned, is now being made up in a new type which is known as the unit chain and which is suitable for single-sided contact drives. This unit type of chain will shortly be in production at the Indianapolis plant and has a great many unique features which are of great interest.

The unit chain is so-called because the individual links combine the functions of spacing as well as of the bushings. It has been intended in the design of the Link-Belt unit chain to impart extreme uniformity in each part in order to insure absolute load distribution and no change of stress direction or weave as each succeeding row of links comes into contact with the sprockets. There are spacing lugs on the links to keep the stress line at

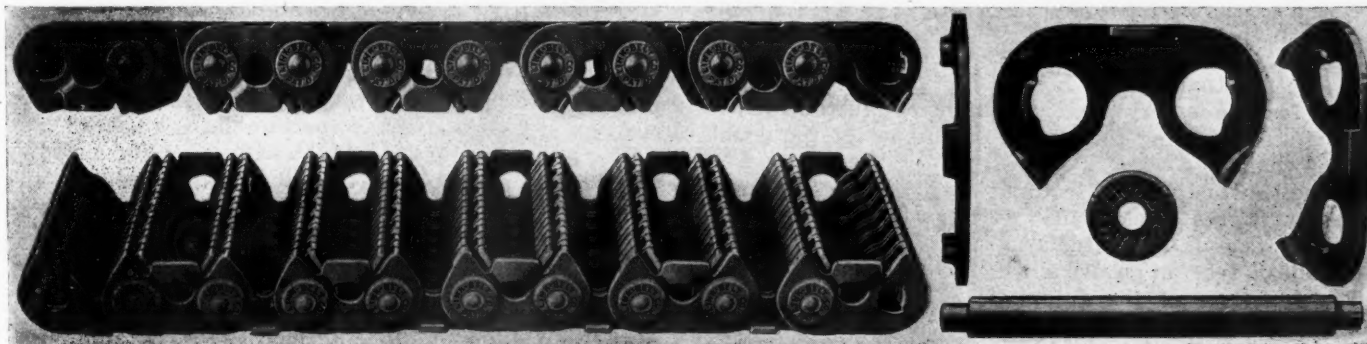


Fig. 1—Link-Belt chain and units of which it is composed

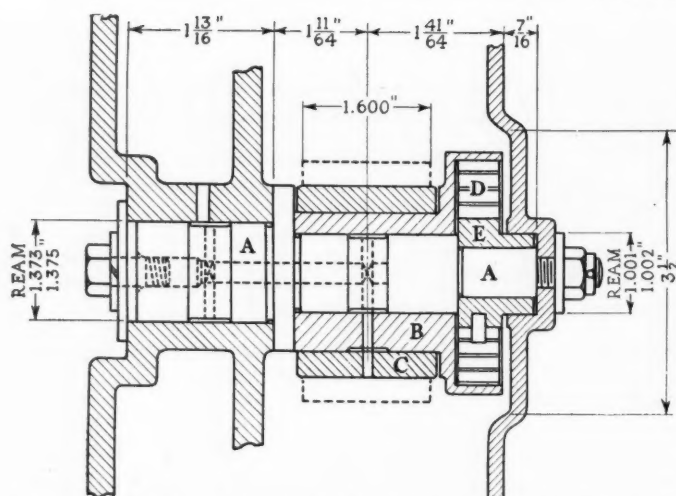


Fig. 2—Link-Belt automatic tension governor for front end drive

all times straight across the chain and equally distributed, this being a most necessary requirement in order to prevent weaves in the chain as it passes around the sprocket in performing the driving function.

One of the main features of the unit chain is that it presents a continuous surface to the sprocket rather than a broken one. This property, it is claimed, resists rough action and also maintains the oil film. Maintenance of the oil film permits cushioning of the drive and consequently much longer life on the chain. It is claimed that the oil film will not break on this type of chain because the continuous surface is far more conducive to maintaining the integrity of the film than is the case with a broken surface which would permit the oil to escape much more readily. In the unit type of chain there is no bushing. The continuous bearing for the pin is coined integrally with the links, which gives equal pin bearings to each length and allows each link in the chain to do a uniform and equal amount of work. The individual links, as well as the entire chain assembly, is designed to put in the qualities necessary to resist the stresses peculiar to camshaft drives.

Some interesting installations of Link-Belt liner type silent chains have been made by the use of the double-sided chain in which some of the links are reversed in order to provide a bearing surface on both sides of the chain. This permits a greater flexibility in design layout, particularly in the drive of auxiliaries. It is possible to obtain sufficient wheel contact with the double-sided chain with shafts in a position where it would be practically impossible to secure the desired amount of contact in any other way. An installation of this kind makes it practically impossible for the timing chain to jump a sprocket tooth as has been known to occur with installations where the chain has not had sufficient contact with the sprocket wheels. The double-sided chain permits of a reverse bend in the chain, which allows it to wrap itself around the wheel with a far greater area of contact than would be possible in any other way. This feature is very clearly brought out in the illustrations accompanying this article on the use of the double-sided chain.

Another installation feature which provides the engineer with greater elasticity of design in using the Link-Belt product is the automatic adjustment device. This includes a tension governor which compensates for wear. The functions of the automatic adjustment are, maintenance of proper tension in the chain; compensation for elongation; increase of effective angle of driving contact; insurance of smooth engagement between the chain and the wheels; elimination of vibration or whipping

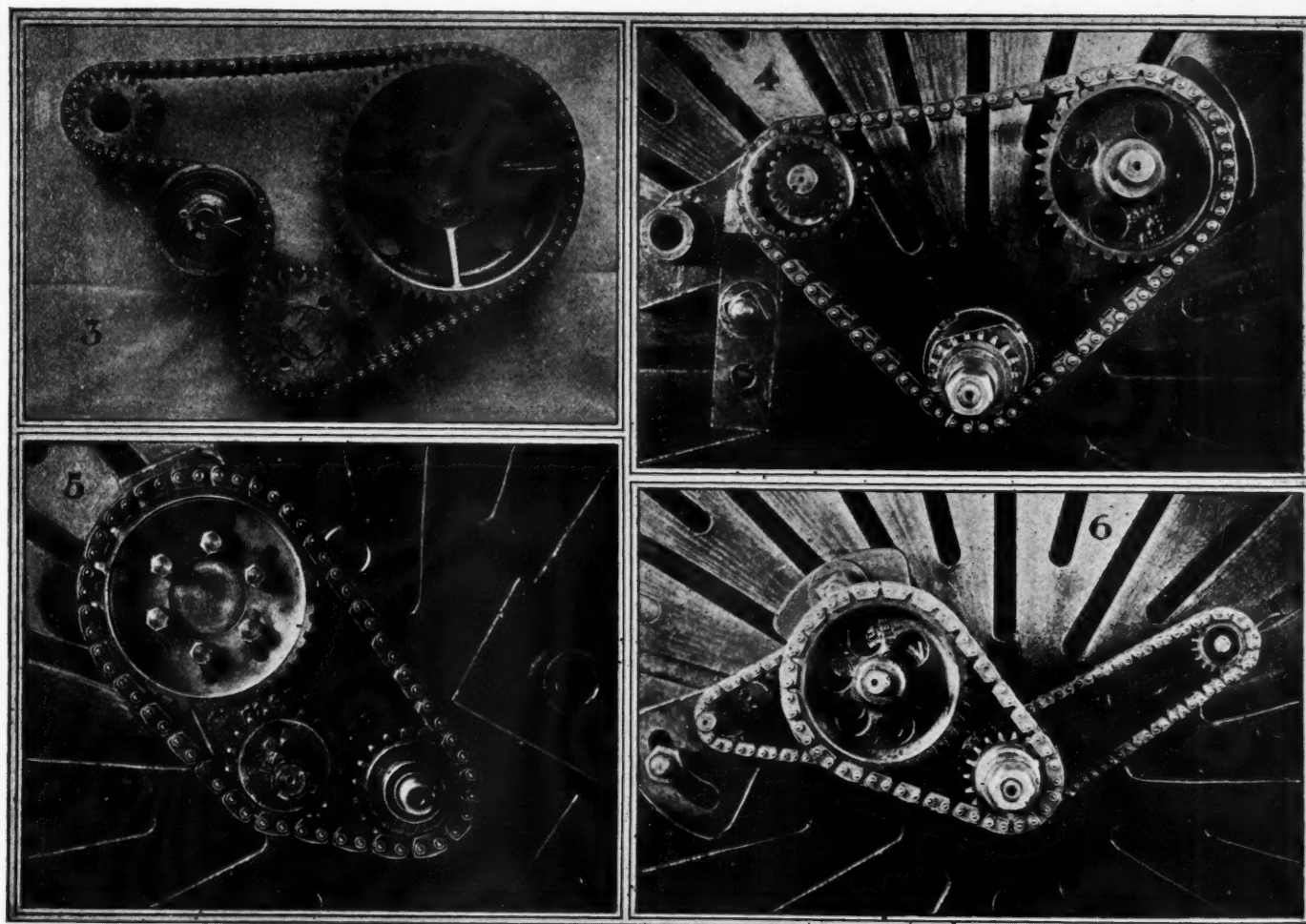
from the chain; and reduction of the amount of attention it is necessary to give the chain in service. The automatic adjustment feature is shown in the sectional drawing, Fig. 2. This is an eccentric device with a spring mounting to maintain constant tension in the chain. The stud, A, is mounted rigidly with the timing gear-case. The eccentric, B, on the stud carries the wheel, C. When the eccentric, B, rotates the wheel, C, moves, regulating the tension in the chain. The amount of tension is controlled by the flat clock spring, D, which is anchored by means of the collar, E, and adjusted by the exterior adjustment nut. The device is lubricated by oil which enters the center of the shaft, as shown in the section. The variety of installations permitted by these different types of layouts permit taking care of any sort of arrangement of the main and auxiliary front end drives.

The manufacture of silent chains is of particular interest because the individual units are very small and yet must be highly accurate. It is self-evident that any error in accuracy in chain manufacture is cumulative; that is, it builds up with the length of the chain and consequently presents a problem in accuracy which is second to none in the line of automotive parts. Link-Belt chain is manufactured from strip alloy steel. This is 3½ per cent chrome nickel stock and for the automotive front end drive chain, which is ⅜ and ½ in. pitch, the strips come in lengths of about 100 ft. Practically all of the machinery used in the manufacture of Link-Belt chain has been developed at the Link-Belt factory and is of a highly specialized character.

The initial operations in the manufacture of the links are the perforating, broaching and blanking. The tool equipment for these three operations is shown herewith. The punches and dies are the only details which differ from those shown. The operation illustrated is broaching. The inspection gages for the operator are shown on the table of the machine. This punch press, which is a Ferracute, operates at the rate of 120 strokes per min., and hence turns out links at the rate of 2 per sec. The strip steel utilized for this purpose is 1 in. in width. An interesting feature of this machine is that the punch pins are longer than the other cutting tools, thereby permitting them to act as locating points. This operation, as well as the majority of operations which follow, is taken care of by girl operators.

After the links are blanked out, they are "shaved" to size. This shaving operation removes metal from all around the outside of the links and makes the edges square with the flat side of the link. The machine is fed by a centrifugal feed hopper, which system is used quite extensively in handling the great number of small links which the machines are required to take care of in the manufacture of the chains. The shaving operation is held to very close limits, as this squares up the entire link and is really one of the vital points in the manufacture of the chain. The centrifugal hopper whirling around throws the links into the feed channel and a scoop device is so arranged that the links cannot enter this channel upside down, but have to go in the desired position so as to be ready for the shaving tool.

The liner type of Link-Belt chains, not the unit type mentioned, employs a chrome nickel steel bushing. The stock for this bushing, which bears upon the chain pin, is strip steel. The first operation on the strip steel is to shear it into more narrow strips. This is accomplished in one operation, the shears splitting the stock into three parts. These narrow strips are then cold rolled to a partial round and this partial round is straightened and cut off to size. This work is done on special machines designed by the Link-Belt Co.



3—Double sided Link-Belt chain installation as used on the new Haynes car incorporating the automatic tension governor. 4—Typical triangular Link-Belt chain arrangement as used on the Rochester-Duesenberg. 5—Automatic tension governor with single sided chain as used on the Mercer. 6—Link-Belt chain installation employed on the Chandler.

The washers which hold the links in position are automatically punched from strip stock. The washers are embossed in an automatic embossing machine and then are sent, together with the bushings and links, to what is known as the "laundry." This consists of a series of tumbling barrels where the various parts are given wet and dry washes to prepare them for heat treatment. A feature of the laundry is the use of heat on the tumbling barrels. These are heated by a flame which plays on the side of the barrel while it is rotating.

The heat-treating furnace is particularly interesting in that it is automatic in its operation. The furnaces are the Bellevue rotary and are electrically heated. They are pitched on an angle so that the parts gradually rotate down to the bottom in the proper time and then drop into the oil quench. The parts which are quenched are conveyed automatically up through the oil and dropped into trays from which they are transported back to the laundry and recleaned.

There are two heat-treating operations. The parts are first packed in compounds in pots and put into the Bellevue furnace, after which they are cleaned and then returned to the heat-treating room and put into cyanide furnaces for hardening. The links are given a 1/64-in. skin. They are taken back to the laundry after this final hardening process and given a wet wash to thoroughly clean them to make them ready for assembly.

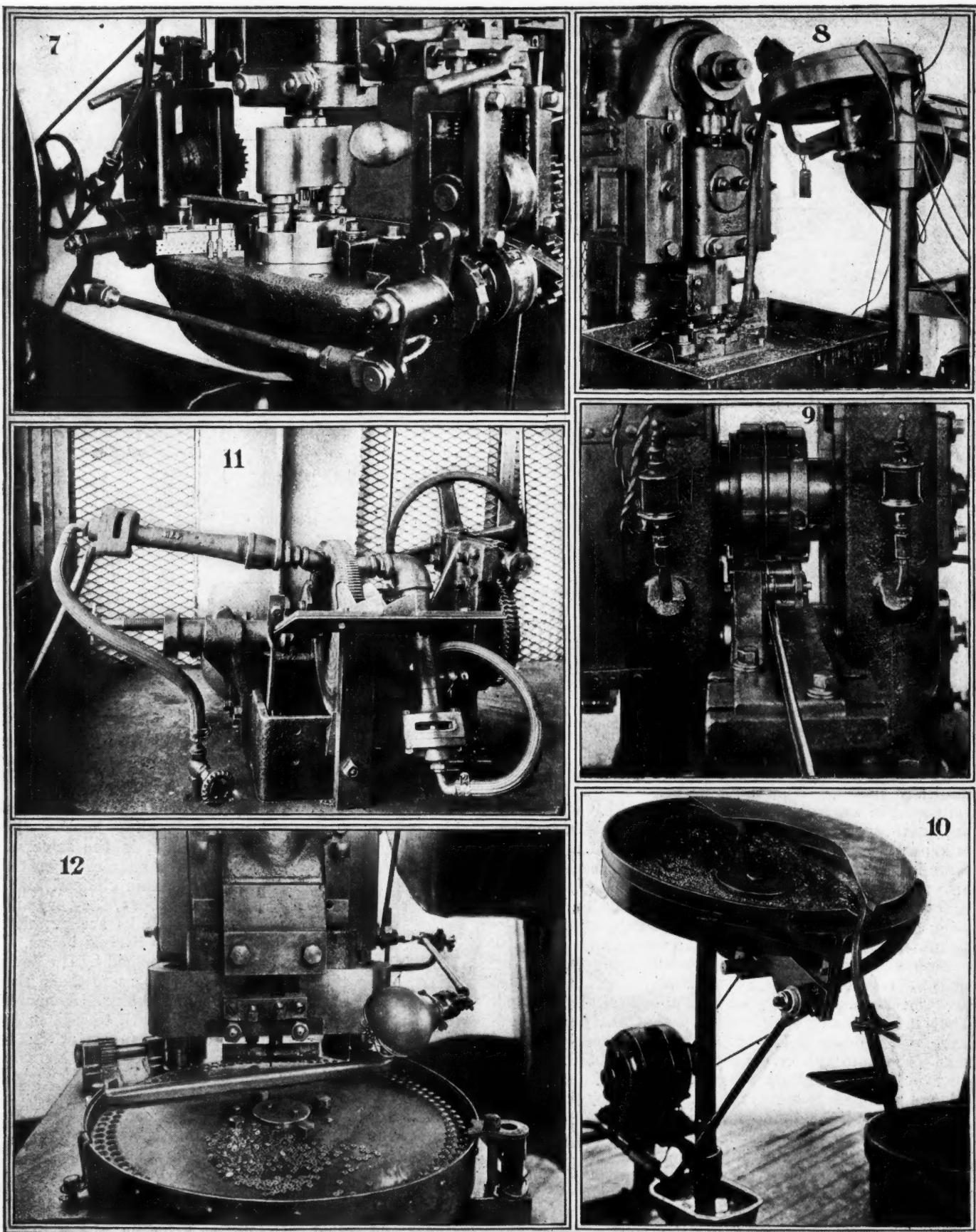
The pins and bushings are brought to a group of girls who straighten them. These girls use little steel mallets to hammer the pins and bushings which are not straight against flat plates. They are very expert at

detecting any lack of straightness in the parts and know just where to strike the part to straighten it out.

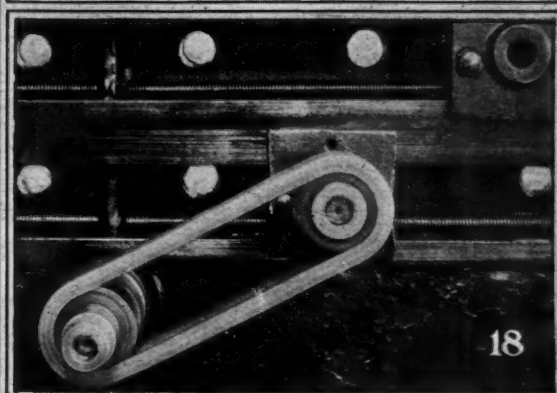
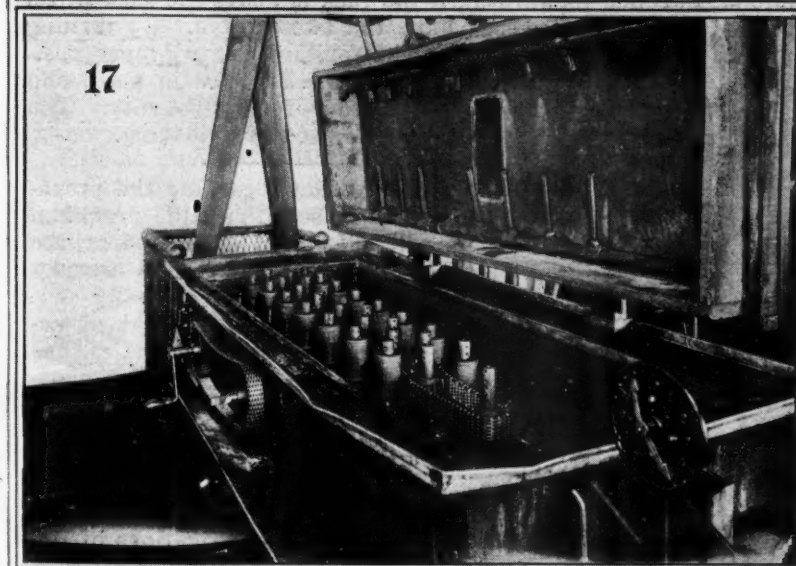
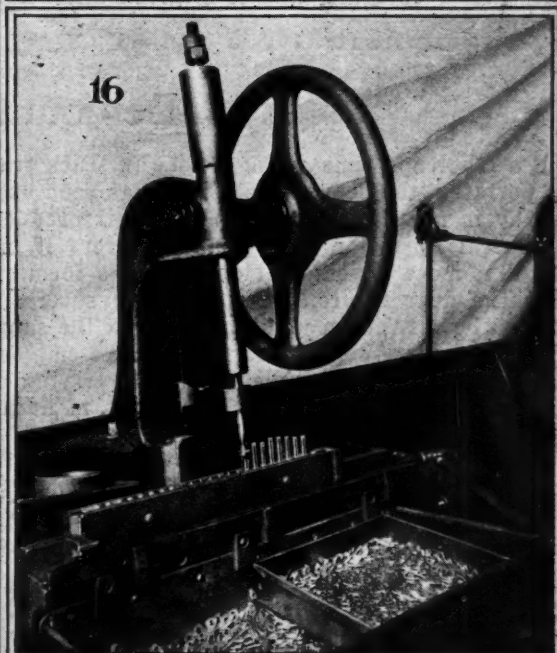
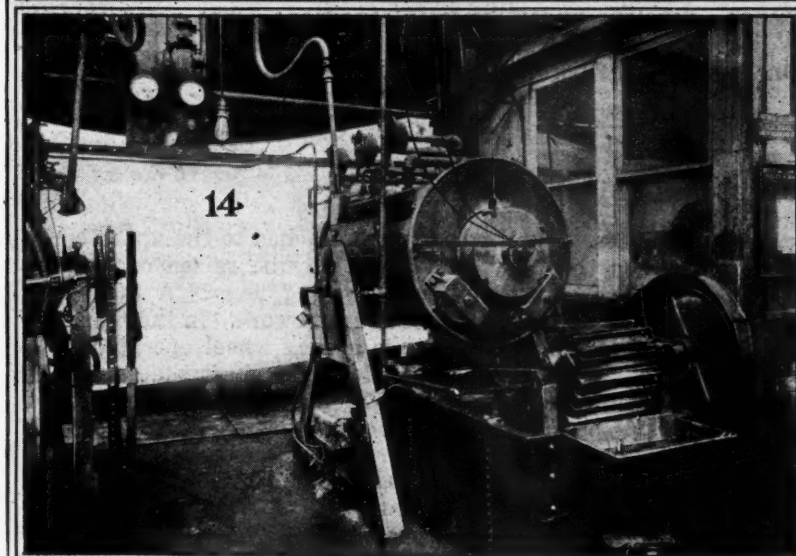
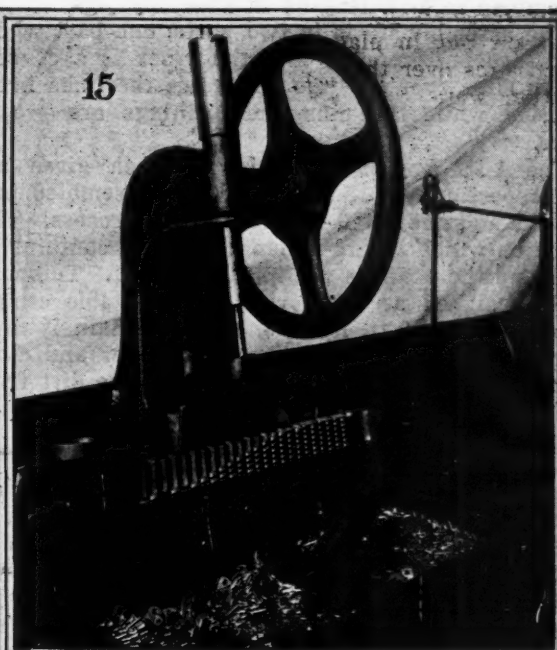
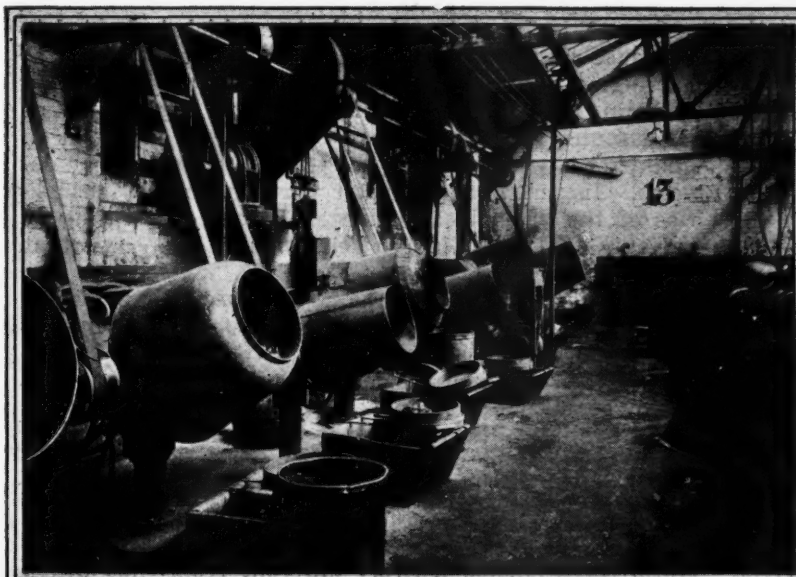
The links are given an automatic inspection in a machine which is provided with a rotating hopper which throws the links into a feed channel in the same way as was previously described for the shaving operation. The links then pass down through this channel and if they are not exact in straightness or size, they are automatically discarded. Only perfect links are permitted to pass through the machine into the barrels below.

One ingenious operation is accomplished by the device for softening the ends of the pins so as to make them easily riveted over in the assembled chains. A machine with a rotating wheel of sufficient width to pick up the pins in a sort of sprocket tooth arrangement on the periphery is employed. The pins are fed into this wheel and guided so they project over on each side a definite amount. A gas flame plays on the part of the pin which projects over the outside of the wheel. As the wheel goes around, the pins drop off into the water, the rotative speed and the diameter of the wheel being so calculated that the ends of the pins have been subjected to the temperature of the gas flame for just the proper length of time. The pins are then placed in a centerless grinder and rolled between two grinding wheels to give them the exact finish size. This is a specially designed machine made at the Link-Belt plant.

This completes the manufacturing operations and brings the various units of the chain up to the point where they are ready for assembly. The pins, links, bushings and washers are all in pans, accurately checked



7—First three operations. Perforating, broaching and blanking. The same tool equipment is used for all three operations, the only details that differ being in the punches and dies. The operation illustrated is broaching. The operator's inspection gages are shown. 8—Shaving operation with centrifugal feed hopper. Shaving removes the break-out from the periphery of the links, making the edges square with the flat side. 9—Cold rolling the bushings for the liner type Link-Belt chain to size. 10—Automatic link inspection machine which only allows perfect links to enter barrel. Rejects are caught in small scoops shown at sides. 11—Annealing the edges of the pins to make riveting possible. Note how ends of pins extend over side of wheels so that gas flame comes in contact with proper links. 12—Automatic machine for embossing the washers



13—Tumbling barrels for cleaning parts before assembly. 14—Heat treating links in automatic furnace. Note pyrometer indicator for operator. Operation of furnace is continuous, the only function of operator being to fill the feeding hopper and adjust burners. 15—The link assembly is built up in links of 1 ft. in the jigs shown herewith. 16—Inserting pins and bushings in liner type Link-Belt chain after cover has been put on jig. 17—One foot lengths as assembled in jigs are connected with 10 ft. lengths which are placed in articulators and are run-in to take up the initial elongation. 18—Final inspection of chain. This photograph was taken with the chains running

with the number of pounds in each pan. The chain is assembled in 1-ft. lengths in assembly jigs.

The assembly jig is in two parts, one part where the links are put in place and the other is a cover plate which slips over the jigs and holds the links in proper position while the pins and bushings are pressed in place.

The 1-ft. lengths of chain are then given a careful inspection and the chain is then assembled in 10-ft. lengths and subjected to a running-in process. The machine on which the 10-ft. lengths is run contains a soda tank and the chain is run in the solution. This machine is so designed as to provide an adjustable center distance for the 10-ft. lengths, and the chain is first run slack and then gradually brought closer and closer to pitch. The soda solution takes all of the dirt from the chain, while the adjustable center distance brings the chain up to its final size, giving the chain its initial stretch, due to taking up the slack parts.

After the 10-ft. length has been run in on this articulator, the chain is given an inspection measurement and must check up accurately to gage. The chain is allowed to run from 35 to 40 min. on the 10-ft. lengths. After inspection it is torn apart and assembled to its proper length. It is inspected for tight joints, the rivets are all gone over carefully and it is given another run in

its finished length at the proper center distances before it is finally tagged as O. K.

One of the laboratory test devices which is located in a silence room consists of a frame with slots running at all angles, making it possible to make any type set-up and run the chain at all inclinations and angles. It has been found that chains may be silent in one position and after slightly rotating the test block, noises may develop. Inasmuch as in motor car service the inequalities of the ground cause the chain to be operating at various angles of inclination, this is an important point.

In connection with the chain plant, there is a laboratory in which it is possible to run the chains under very severe conditions, submitting them to endurance tests under stresses which are far higher than anything that would be encountered in actual service. This has resulted in break-down figures for a number of types of chains which give an accurate clue to causes of chain failures. One of the most interesting points which has been brought out by photo-micrographic study and other methods is that the line of weakness in a chain under static conditions is entirely different from that which develops under dynamic conditions. The point of failure under dynamic conditions does not at all correspond with the point of failure under static conditions.

A Demountable Body Carriage

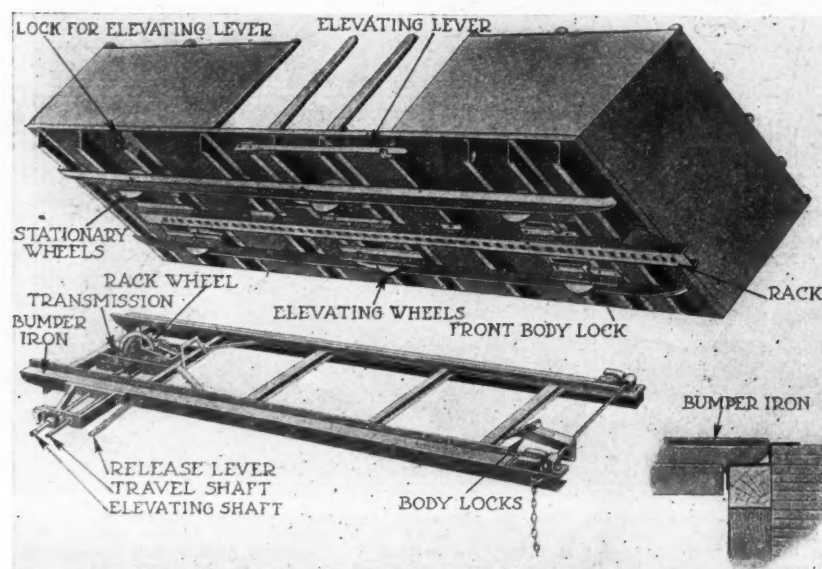
AS a labor and time-saving device in truck transportation the demountable body has been used successfully in many instances. While their production is not general by motor truck manufacturers it is quite likely that more buyers will demand this form of body within the near future. In some cases several operations can be carried on with one truck at the same time when two or more demountable bodies are employed.

One man can load or unload a body carrying from a 2½ to 8-ton load by means of equipment, manufactured by the Ideal Truck Equipment Company.

The carriage for the removable body comprises a steel framework attached to the chassis and a similar framework attached to the bottom of the body. These frames consist of two channels each, supported by cross

members. Small wheels are attached to the upper channels on the body, and these may be raised or lowered at will by means of an elevating lever. A rack runs down the center of the body framework. In the rear center of the chassis frame is a rack wheel operated by a crank. There is also an elevating shaft that makes it possible to raise or lower the framework to the level of the surface upon which the body is placed before loading. Bumper irons at the rear ride over a stringer attached to the loading platform, thus maintaining the tracks flush with the platform.

When the truck is backed to the loading point the body is rolled forward until the rack is above the rack wheel when it is lowered until the two engage. By turning the crank body is brought forward to its proper position, the locks are snapped in place and the load is ready for its journey. The same method is used in unloading.



Ideal Truck Equipment Company's demountable body carriage

AN investigation regarding the preparation and uses of metallic zirconium and its salts has been conducted by the Bureau of Mines and the results are just now made public.

Coherent white zirconium metal, on account of its acid-resisting properties, has been suggested as a substitute for platinum in certain cases. Crucibles prepared from zirconium oxide were proved in the experiments of the Bureau of Mines to be superior for high temperature work to any crucibles procured on the market.

The results of the investigations of the Bureau of Mines are available in Bulletin 186, "Investigations of zirconium with especial reference to the metal and oxide," by J. W. Marden and M. N. Rich, which is distributed by the Superintendent of Documents, Washington.

Government Aid Necessary to Foreign Commercial Flying

British and French aerial navigation companies find present costs of operation far above revenues from passenger rates. Four types of machines considered best for various services in France.

EXISTENCE of companies operating passenger and freight airplanes in France and England is largely dependent upon government subsidies. Present operating costs are so high that were these navigation concerns to depend solely upon revenues received in passenger and freight rates they would be forced to discontinue business or else increase their prices to a prohibitive figure.

Official figures show that the present cost of operation on regular passenger carrying services is about 10 francs per kilometer for single-engine planes of 300 hp., and 15 to 16 francs per kilometer for twin-engine planes having two motors of 260 hp. each. Taking as an example the Paris-London service, distance 250 miles, operating to 80 per cent of schedule in summer and 70 per cent in winter, the receipts per kilometer are made up as follows:

Twin-Engine Type Machine, Farman Goliath, with Two 260-Hp. Salmson Engine, Carrying Two-Thirds of the Maximum Load, or Six Passengers and 440 Lb. of Goods

	Fr.	C.	
For passengers and freight, per kilometer....	8	00	37 per cent
Flying subsidy	8	50	} 14 00 63 per cent
Efficiency subsidy	5	50	
	22	00	

Single-Engine Type Machine, Breguet, with 300-Hp. Renault Engine, Carrying Two-Thirds of the Maximum Load, or Three Passengers and 66 Lb. of Freight

	Fr.	C.	
For passengers and freight, per kilometer....	3	00	33 per cent
Flying subsidy	4	50	} 7 00 67 per cent
Efficiency subsidy	2	50	
	10	00	

Experience shows that all the advantages lie with the big multi-engine plane, the mileage earnings of which are sufficiently high to assure the success of the operating company, on condition that passengers are always available and that weather conditions permit of a regular service. The subsidies available under the French scheme are equal to two-thirds of the total earnings, and with these subsidies it ought to be possible to reduce present passenger fares and freight charges by 25 per cent.

Results of French Experience

The lessons learned from commercial airplane service in France are that the following special kinds of machines should be developed:

Passenger carrying plane: Multi-engine plane with at least three engines, capable of flying with one engine shut down, landing easily and taking off quickly, a wide range of speed, coefficient 6, engines easily accessible while in flight, engines capable of 120 hours' flight without overhauling, mechanical starting, ability to fly under full load for five hours, equipped with a cabin for the crew, wireless cabin, passenger cabin 78 x 70 in. Ceiling, 13,000 ft.; speed at an altitude of 6500 metres, 125 miles an hour; total tonnage, 1½ tons, and radius of action, 560 miles.

Postal Plane.—Single-engine machine with a wide range of speed, coefficient of security 8, mechanical engine starting, ability to fly four hours under full load; pilot's cabin, mail-hold to receive 5 mailbags weighing 90 pounds each; practical ceiling, 13,000 ft.; speed at 6500 ft., 155 miles an hour; fuel for four hours' flight; useful load, 450 pounds; radius of action, 500 miles.

Touring Plane.—Single-engine plane carrying two passengers and 200 pounds of baggage. This plane should be easy to pilot, of all-metal construction, having a coefficient of security of 5, and an engine capable of operating 150 hours without overhaul. Fuel consumption less than 6 gal. per hour's flight at full power; five hours' fuel supply; practical ceiling, 10,000 ft.; speed at 6500 ft., 125 miles an hour; useful load 330 pounds; radius of action, 450 miles.

Commercial Flying Boat.—Multi-engine plane capable of flying with one of its engines stopped at a height of 1500 ft. for two hours with its full useful load and two hours' gasoline. Ability to navigate on the water until the entire gasoline supply is exhausted; useful load, 1 ton; cruising speed, 80 miles an hour; maximum speed, 100 miles an hour. Gasoline supply for five hours' flight at full speed; cabin for eight passengers separated from the baggage-hold; gasoline tanks separate from the hull; engines readily accessible when in flight; mechanical engine starting; wireless transmitting and receiving set capable of carrying 180 miles; coefficient of security 6; radius of action, 500 miles.

Military Types Predominated

Practically all the French commercial planes in service during the past year were military types or modifications of military types, the only important exception being the Farman twin-engine Goliath, which is now being replaced by a rather bigger type with three engines. The new big capacity commercial planes under construction and likely to go into service at an early date are the Bleriot Mammoth with four Hispano-Suiza engines of 300 hp. each, total weight, 7½ tons; speed, 93 miles an hour, and the Breguet Leviathan, with four Bugatti engines of 250 hp. each; total weight, 6¼ tons.

ACCORDING to *Der Rationelle Werkbetrieb*, the well-known German light alloy, duralumin, which is much used in aircraft construction, can be refined and toughened by quenching as well as by cooling in the air. Strange to say, however, it must be allowed to season for four days after the heat treatment is completed. An approved quenching bath for duralumin consists of a 10 per cent solution of sodium hydrate at 30 deg. Cent., in which the metal is allowed to remain for five minutes. This is followed by a bath consisting of three parts of nitric acid, one part of sulphuric acid and twelve parts of water. The parts must be well rinsed.



The FORUM



Grinding Splined Shafts

Editor, AUTOMOTIVE INDUSTRIES:

Referring to the article in the Sept. 15 issue with reference to "Tolerance Allowed in Grinding Splined Shafts," I wish to take issue with the author thereof in regard to some of the statements made.

The article states: "It will be noted that the bearing is solely on the ground surface of the inner diameter of the fitting." True. But the said "ground surface" is commercially obtained only by a process claimed to be covered by patents.

It also states that: "It is an easy operation to grind the bore of the spline fitting." True, if the hole happens to be a comparatively short one as in a gear. But how would you grind on a commercial basis a hole $4\frac{1}{2}$ to 5 in. long, and from 1 to $1\frac{1}{4}$ in. in diameter as required in the propeller shafts? Of course, such grinding can be done if you wish to pay the price, but it is not necessary in order to get a satisfactory spline fitting, and if adopted would add an unnecessary additional cost burden.

Regarding life of broach with .001 in. tolerance on the O. D. if a good finish with accurate width of spline is to be maintained, a rebroaching or "finishing" cut will in most cases be required. If the limits of the width of the splines, parallelism, and finish are to be maintained comparable with .001 in. tolerance on the O. D., the latter will not cause serious additional trouble or expense. The rebroaching may be done with either a special finishing broach or with a standard broach which is later used for roughing, after it becomes dull enough to require re-sharpening.

Regarding the advantage claimed for lubrication, a clearance on the small diameter is of even greater value from a lubrication point of view than is a clearance on the large diameter.

If the methods and suggested tables of fits suggested were to be adopted as standards by the Society of Automotive Engineers, much unnecessary expense and patented methods would be thrust upon the makers of automobiles without any commensurate return, and the implication the article carries that the Society of Automotive Engineers or other organizations have been derelict in adopting these or other similar shaft dimensions, I believe to be not warranted by the facts.

The idea of such shaft standards is not new, such suggestions having been made and discussed on several occasions in S. A. E. meetings. Every time, however, that this subject has been brought up for discussion in the meetings of the Standards Committee or of the Society, leading and well known engineers have stood against such attempt of standardization for the reason that a spline fitting contains many surfaces which are sure to change their relations to greater or less extent with heat treatment. The question has been raised as to whether the close fit should be on the large diameter or on the smaller diameter. The actual determination of this question must depend upon individual requirements and shop equipment and will depend upon what surfaces, if any, are to be ground after hardening, whether the fit on the sides of the splines

should be free as in transmission gears or very close as in propeller shafts, whether one or both parts are to be heat-treated after machining and whether one or both parts are to be ground after heat treatment. From this it will be seen that if standards for the shaft ends were to be adopted, it would be necessary to very greatly extend the scope of the standards proposed by the article referring to the Gear Grinding Machinery Company's practice, as many spline parts are heat-treated before machining and, therefore, require no grinding, while many other spline parts are used where the conditions do not require the refinement of grinding. In many instances, also, one part of the spline fitting is hardened after splining, while the other part is left comparatively soft. Therefore, when the subject has come up for general discussion, the action after discussion has always been unanimous or nearly so, to the effect that all that can be accomplished in the way of standards is the standardization of the broaches, and, consequently, of the soft broached holes, but that material to be allowed for the grinding processes employed and character of the fit required must necessarily leave the other limits and tolerances to the judgment of the individual designing engineer.

C. W. SPICER, Vice-President,
Spicer Mfg. Corporation.

Fan Dynamometers

Editor, AUTOMOTIVE INDUSTRIES:

Your editorial in the September 15 issue on the use of cradle type fan dynamometers directs attention to an extremely important phase of modern engine production in the automotive field. The fan dynamometer must have its chief usefulness as a production device, which is to say that the testing under load of every engine produced is of such importance as to warrant a thorough study of proper testing means.

A weakness in our passenger car industry to-day is the lack of proper tests of completed engines and cars. In many instances reliance is placed merely on careful inspection during manufacture. Many dealers have stories to tell of cars delivered from the factory which require expenditure of a considerable sum to put right, because they were not made right before they were shipped.

This is notably the case with cars in the medium-priced field. A carefully considered testing schedule which positively detects defects before cars get in the hands of users is bound to react to the standing of the manufacturer in the eyes of his dealers and his public, and is as well worth the cost in the medium- and low-priced field as in the high-priced field, where such tests are now regularly employed.

When it comes to considering the method of testing for production purposes, however, it is not clear that a fan dynamometer of the cradle type is the solution. Already a large number of plants have installed the simplified "electric block test" system. The result is a working schedule which provides not only for the loading of the engines but for the adjustment of this load

through a wide range while the engine is in test in order to meet the requirements of a progressively increasing load as the engine works in. Measurement of friction horsepower is provided for, which is a very important factor in building new engines, as it sets a definite standard of assembly; friction being held to a definite minimum on test. There is also, with the

electric method, a large saving by the utilization of electric energy in the shop. The importance of this last factor has been emphasized during some winters which are fresh in our memory, when coal was hard to obtain and the plants which had the electric block test system could keep running.

SPRAGUE ELECTRIC WORKS,
C. F. Scott, Manager, Apparatus Sales.

The Automobile in Peru

OF the 3000 automobiles and trucks in Peru, perhaps 2000 are in Lima, the capital. The majority of the streets of the city are in poor condition, being paved with round pebbles, gathered up along the seashore. The public square, however, has recently been paved with asphalt. The main business street and one of the leading avenues is also asphalt. Through these two streets the automobiles pass out to a drive along the seashore between Lima, the capital, and the suburbs, Miraflores and Callao. This drive, called the Miramar, is in fair condition, partly paved with pebbles, but if not continually repaired, will soon become unsuitable for automobiles. The automobiles outside of the capital, as far as roads are concerned, do not fare much better than those in it.

It is impossible to give the exact distribution of the automobiles and trucks outside of Lima, but, in the main, they are situated in, and in the vicinity of the following cities:

Chiclayo	175.
Trujillo	125
Tarma	30
Cañete	146
Arequipa	99
Ica	199
Chincha	190
Scattering	36

Total1000

The "scattering" will be found in Huacho, Supe, Pacasmayo, Cerro de Pasco, etc. In these cities themselves, except those situated near the oil belt to the north, where petroleum has been used to improve the roads, very little has been done for the streets. The roads around these cities, where not impassably rough, are mere stretches of sand.

The automobiles now in Peru, as they have mostly come in during war time and immediately since the war, are largely of American make. There are present a surprisingly large number of the higher grade American cars. Travelers who have visited Lima state that, in proportion to the total number of cars in Lima, there is no other city that has so large a number of high grade cars. Indeed, it is only recently that the popular-priced American car has come to its own in Peru.

The European car is present also and its numbers will doubtless increase as the factories in Europe recover from the effects of the war. The principal English, French, Italian and German cars are now represented.

With the truck, the European manufacturers are making more headway than with the automobile. Many big European trucks have been put in service within the last year and may be seen on the streets of Lima. Two large trucks of a well-known French make with passenger bodies have just been put on a direct route over a new macadam road between Lima and Miraflores, a dis-

tance of some nine miles. Miraflores is one of the bathing resorts of the capital and the suburb where reside most of the foreign residents of Lima. These two passenger buses will have to compete with the interurban electric line, to some extent, although they traverse slightly different districts.

Owing to the unfavorable exchange rates, the Peruvian pound having lost one-third of its purchasing power due to the fall in the price of sugar, wool, cotton and copper and the consequential lack of exportation of these products, few automobiles and trucks have been imported from the United States this year. When exports pick up and exchange improves, there should be a market here.

Although Peru is suffering along with the other countries of South America and the world from financial depression, the month of July in Peru has been a glorious one for the automobile dealer. The reason for this is that during July was celebrated the 100th year of the Independence of Peru and every one who could purchased an automobile as the best possible way in which to signalize an event of such far reaching importance.

Protests in French Fuel Economy Contest

IN a letter addressed to *La Vie Automobile*, Goudard & Mennesson, manufacturers of the Solex carburetor, complain of some of the practices pursued in the recent French fuel economy contest. It appears that one of the contestants asked the management six weeks before the contest whether it would be permissible to draw the air for the carburetor through the crank chamber containing the lubricating oil. It was decided by the management to modify the regulations so as to permit of this, and all contestants were notified ten days in advance of the contest of this change in the rules. The following day the Solex firm sent a written protest against what they are pleased to call "this tomfoolery," of carbureting the crankcase oil, which is maintained in a state of ebullition by means of an electric current, the cost of which is not taken into account in the classification. The amended rules, they say, even provided for a reserve oil tank on the footboard for use in case the contents of the crankcase should not suffice.

They refuse to admit the argument that in two-stroke engines the combustible charge, carrying a certain amount of oil, is drawn through the crankcase, as in this class of engine the oil is mixed with the fuel in advance and is therefore measured with the fuel. They do not care, they say, what kind of fuel is used as long as it is measured, but they ridicule the plan of burning lubricating oil at 4 francs per 5000 calories instead of benzol at 2 francs per 10,000 calories. Automobile manufacturers have remained entirely ignorant of this practice, which was instigated by a carburetor firm looking after the technical adaptation of the vehicles.

Choosing Men Through Employment Departments

Larger organizations find specially trained men for employment managers valuable, but the necessity of close contact with supervisors within the plant is pointed out. Present status of employment departments is more or less unsatisfactory but proper development would increase efficiency.

By Harry Tipper

THE analyses of labor turnover which have been made from time to time have indicated the necessity for some means of selecting employees, so that the expense of hiring and firing could be reduced and the stability of the organization personnel increased accordingly.

In large companies the employment department is very actively engaged in making records of the various applicants, keeping close to the developments, and endeavoring to sort out in a preliminary way, at least, those who are more efficient and more desirable. In fact, this work has gone forward to such an extent that a bibliography of a number of books has grown up dealing with the employment, the management of employment bureaus and the general method of selecting employees. Tests have been prepared intended to indicate the alertness, the potential value and the other characteristics of the worker outside of those involved in his skill.

Where thousands of employees are being handled with the usual percentage of turnover per month, the possibilities of selection are correspondingly reduced. Such a section of the skilled and unskilled occupations makes it impossible to reach a high average of efficiency by selecting from the general number of applicants those who are more capable. In the ranks of twenty or twenty-five thousand employees, the general differences in skill and potential capacity will be about in the same proportion as those obtaining throughout the number engaged in such occupations.

In the case of each individual concern, however, the attempt is made to select employees to represent as large a proportion of the more efficient and capable as it is possible to secure, and this is the main purpose of the employment bureau with its systems of examination and its continuance of record.

In the larger organizations it has been felt that selection of employees by a department specially trained for that purpose and carrying the responsibility for the selection results in a better general type than where the selection of the employees is left to the individual supervisor.

The results have not been entirely satisfactory, however, and the turnover has not responded to these methods of selection in any notable way. Of course, many of these employment bureaus have been successful to a degree in improving the situation that obtained previous to their establishment, but this fact is not sufficient to justify the endorsement of the method nor to illustrate the value of the various systems now in use by these bureaus.

One of the difficulties in connection with this development is the tendency for the work of selection to become extremely technical and mechanical in its application so that the tests and examinations become sufficient in themselves and not merely indications.

Obviously, the applicants for work at a large factory represent a sufficient number at any time to make the work of personal interviewing difficult, if not impossible, and the only method at present available is the method of record and examination by standards, written tests and questions.

Able men have been successful in the use of these systems and in drawing from them a great many of the factors required to determine the relative value of the different applicants.

The tendency to accord to the system the success of the development has been great and this tendency has emphasized the system beyond the actual facts and led to its adoption where the conditions would not warrant its development.

In the selection of employees it is desirable to consider, from a human standpoint, the factors that make up the efficiency of a department and the stability of employment therein.

Previous to the development of employment bureaus, the work of hiring was left as a rule to the supervisors in each different department of the organization with the result that there were as many methods of hiring as there were supervisors. There was no co-ordination and the man who was proved unsatisfactory by one supervisor was found to be satisfactory under another.

Under these circumstances men were hired and discharged from one department without having any opportunity to get into work in any other section of the company and with a considerable loss to the company for the time spent in adjusting the employee to the organization. Cases of injustice were more or less frequent and personal grievance of the employee toward the supervisor was a cause of trouble at all times.

These conditions led to the establishment of the employment departments with their regular methods of selection and in some cases with the records and considerations of promotion. A great deal has been gained by this change and a certain amount has been lost.

The factors required in the selection of employees for a particular department are:

1. The requisite skill in the work.
2. The desire for permanent employment in one place.

3. A sufficient measure of adaptability.
4. Possibility for harmonious contact with the supervisor.
5. The ability to work co-operatively with other men.

The proper adjustment of these values in the selection of the employees depends upon the supervisor as much as upon the employee selected.

The Supervisor As Employer

Where the selection is undertaken by a different man from the supervisor, the sympathy with the employee is not quite as definite as it should be. Furthermore, the sense of responsibility is not as definitely placed upon the supervisor, and the patience which must be exercised in adjusting new employees to the organization so that the greatest efficiency can be secured is not always visible under these conditions.

In some cases this objection has been met by the employment bureau acting to select the workers for the approval of the supervisor after the preliminary selection has been made.

The advantages secured through the establishment of employment bureaus have been secured in the face of almost a total lack of education of supervisors in the problem of securing a sound co-operative organization among the workers. Until the last two or three years practically nothing was done to educate the foremen and other supervisors in the factory, while in the commercial end of business nothing of importance has been done up to the present, except in a few individual cases.

So long as the supervisors are not educated in the fundamentals of good organization and the methods of handling employees, the specialized department devoted to the selection of employees is a necessary matter in the large plant and cannot be dispensed with very well. It will not entirely solve the problem, however.

The selection of employees is limited to the available material, so that it will vary according to the extent of employment through those occupations, and a selection in this manner does very little to provide the preliminary possibilities of permanency and efficiency in the organization condition.

Most of the plants in the United States in point of number do not have a sufficiently large payroll to require an employment bureau exclusively for the purpose of selecting the employees. In these cases, however, the matter is not handled more efficiently as the usual procedure is to designate some one or two persons to interview the applicants, take such records and tests as have been decided upon, and submit these to the su-

perisors or notify the supervisors that such workers are available.

There are notable exceptions to these conditions in the different branches of the metal trades industry, but the methods of selecting employees have not received the study given to the selection of machinery or other mechanical appliances, nor have they affected the efficiency of the employees or the permanence of employment in any considerable degree. Here, as in other cases in connection with the human relations problem in production, the systems and mechanics of organization have been permitted to stand in the place of judgment and understanding to a considerable extent.

No method of selecting employees can take the place of the personal interview where the interviewer is sufficiently able to put the applicant at his ease, to draw him into conversation and secure from the casual reactions the actual tendency of his interest and capacity. The mechanical skill required of the individual can be determined with comparative ease. The other qualities cannot be so readily discerned. They can be discovered only through the exercise of considerable judgment on the part of the interviewer with a careful understanding of the conditions of the interview.

Employment bureaus in the larger establishments and the employment officials in the smaller establishments cost a great deal too much if their value is confined to the routine of recording expenses and securing answers to test questions. On the other hand, employment bureaus that function with understanding, knowing the supervisors, their methods of operation and their personal idiosyncrasies, would be worth a great deal more than is now expended upon the employment bureau, because of their ability to increase the permanence and efficiency of the general organization.

A Matter of Guesswork

The selection of employees is largely a matter of guesswork even with the best of the present systems and with all the ability to be secured under normal conditions. This guesswork should be recognized and the speculative factors understood in dealing with the situation, so that the systems of selection are not called upon to perform functions that they are not capable of fulfilling.

They are useful in their way. They are a great deal more useful for what they prevent than for what they secure, but they are by no means justified in their present condition by the general situations, and further analysis is necessary to produce the kind of employment selection that will make for effective organization.

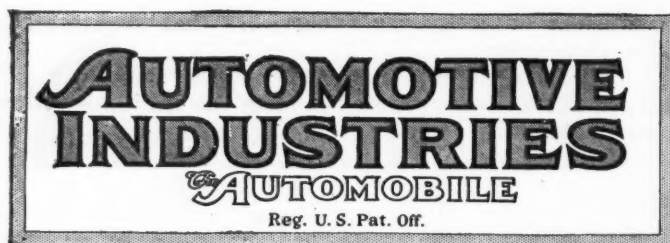
Convenience in Car Bodies

BRITISH manufacturers, as well as those in other countries, are scored by a correspondent of the *London Times* for their failure to supply owner-driven cars with adequate body equipment and conveniences. Adjustable pedals, means for carrying the jack, tire pump, oil can, spare wheel, tools and other articles are things the owner driver wants, the correspondent declares. Adjustable individual footrests for rear passengers would add largely to their comfort.

Complaint is registered in the matter of floor boards made in such a way that grit and dust work through into the mechanism below and lack of handles of sensible design to remove them for oiling chassis parts. Floor boards that are screwed down afford little opportunity to

follow the instructions given to oil the clutch withdrawing mechanism and spigot bearing daily. Pocket, shelf and drawer accommodations are also pointed out as being lacking so far as convenience is concerned.

"Finally," writes the correspondent, "the craze which body builders have for constructing a car with a sporting line heads in most cases directly away from comfort. Seat backs are made too low for shoulder support, and although a semi-recumbent position can be comfortable for the driver, who is practically held in place by pedals and steering wheel, it is, in my opinion, more fatiguing for a passenger than the less sporting and more sitting posture. Appearance counts for a good deal but should be of secondary importance."



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The Railroad Strike and the Automotive Industry

THE automotive industry will face a great responsibility and a great opportunity if the proposed rail strike takes place. It is sincerely to be hoped that some means will be found of averting a tie-up of railroad transportation. But if such means are not found, the responsibility for keeping open the main avenues of transportation, of supplying the public with necessities, and of keeping business from stagnation will rest largely upon the automotive industry.

The industry has emphasized the utility functions of automotive vehicles for some years past. If the railroad strike actually takes place, an opportunity will be given to prove these utility claims in a most practical manner. The problem will be chiefly one of organization and cooperation. There is no doubt of the ability of the nine million vehicles in this country to perform an effective service in this emergency. Every individual and every association of individuals

within the industry, however, will have to cooperate in organization and service if a first-class job is to be done.

The N. A. C. C. has already wired President Harding, offering the services of the automobile industry in the mobilization of motor transport if needed. Manufacturers, dealers, and owners operating together can perform an immense public service in this emergency—and incidentally give an intensely practical demonstration of the possibilities of motor transport.

Profiting by Experience

IT would seem to be the most obvious action for every automotive manufacturer to take to make it a point to see that each series of vehicles turned out is free from difficulties which had developed in earlier models, at least so far as this is possible through care in design and manufacture. He has, or certainly should have and make available to his engineering and production departments, service records which show wherein faults or failures have developed. Yet it is not an uncommon thing for a car to display the same failings year after year. Even major faults are not always remedied, but minor troubles, due very often more to carelessness in production or assembly than to inherently faulty design, are frequently allowed to persist, with the result that sales resistance to that particular make of car increases. Much money must then be spent in overcoming this resistance which might far better have been spent in remedying the fault in the first instance.

A condition of this sort is due primarily either to indifference or more likely to failure to study the performance of the car at first hand and the conditions which the purchaser meets in its use. The engineering department frequently tests the cars which it designs, but too frequently these tests are made under more or less ideal conditions, over good roads and with a mechanic, who knows the car thoroughly, at hand to make any necessary adjustments, with the result that the engineer fails to experience personally the difficulties which the man who purchases the car later and has little knowledge of mechanical matters is sure to encounter. Some of these troubles are taken care of by the service station and should be regularly reported back to the engineering and production departments, but some of the less serious ones, which do not prevent operation of the car, are allowed to continue, in spite of the annoyance they cause the operator.

It would pay every car manufacturer to oblige his designing engineers as well as some responsible men in his production and assembly force to take new cars in precisely the same condition in which they are turned over to purchasers, and drive them for several thousand miles under rather severe road conditions, making sure that the men who drive the car effect all required repairs and adjustments themselves, preferably using for road repairs only those tools furnished with the car. First-hand experience of this kind is the best eye-opener known. It will

teach the engineer lessons in respect to accessibility and dependability, or the lack of these qualities, which are seldom appreciated until they have annoyed the purchaser to the point of exasperation, and it will instruct men responsible for production and assembly in the need for care and thoroughness as no talks by the executive or complaints from the service department can ever do.

The men on the factory staff too frequently lack perspective, are too close to their own job to appreciate the viewpoint of the consumer of their product.

Exporting Possibilities

FROM the newspaper columns the information has been gleaned that an Irishman named William Fitzgerald, described as a literary man who has spent much time in America, has obtained a ten-year monopoly to run motor buses in Spain. Another news item chronicles the fact that the French are planning to establish an automobile route across the Sahara Desert and that experiments looking toward this end were about to be started with cars of the caterpillar type with a rubber band, invented by the engineer Hinsten.

Regarding the Spanish project. Just now there is no such motor bus transportation in Spain; in fact, local transportation there is almost non-existent. Mr. Fitzgerald has formed a company with a capital of about \$5,600,000 in which a large London engineering firm and the London Motor Bus Company are interested.

What is true in Spain is true in other countries regarding the lack of local transportation facilities. Those who deplore the lack of an export market at the present time might do well to look into this phase of the situation. These casual news items indicate that automotive products are being sold in foreign countries. Buses will be imported in Spain and they will probably be of British design. Sooner or later other countries will begin to import buses.

The Sahara Desert project, aside from offering an exporting opportunity, will open up an important avenue of trade. It will mean the establishment of traffic throughout the entire French African empire and this will be enormously important for the future development of that area.

Applying "Pure" Science

ENGINEERING is sometimes said to consist in the practical application of "pure" science, but engineers are not always well grounded in their knowledge of the fundamental laws of science, nor do they always make use of this knowledge when they are well informed regarding it. Cases in which certain scientific information has been put to good use are not hard to find, and one such application, involving the use of neon, one of the rarer gases in the earth's atmosphere, was described in the last issue of AUTOMOTIVE INDUSTRIES.

Another property of neon which we believe is not generally known has been used in certain research work and can, no doubt, be applied in the automotive

industry. A discharge between the electrodes of a tube filled with neon takes place with great rapidity, requiring, it is said, but a few millionths of a second. This fact can be made use of by employing such a tube in place of and more conveniently than a stroboscope to secure successive instantaneous views of an object, such as a valve, in motion too rapid to be followed by the eye. To make such observations of the parts of an engine, for example, the tube is set up in a darkened room in which the engine is to be run and is connected in a high-tension circuit in series with a commutator driven in timed relation to the engine and so arranged that contact can be made, by varying the timing lever position, at any desired point in the cycle of the engine. A flash of light will be given at this point, and the parts of the engine illuminated by this flash of light alone during this very short interval will appear to the eye of the observer to be at rest. It is thus possible to detect valve chatter, observe the position of rapidly moving chain links in reference to sprocket teeth, note the position of springs in relation to positively moved parts, etc.

Engineers can often make use of a knowledge of facts of this character gained in a study of physics, chemistry and other of the pure sciences, and should, so far as possible, make it a point to follow developments in these fields.

Find Out First

SOMETIMES a manufacturer spends several thousand dollars in perfecting an idea in his own factory that has already worked out successfully in some other plant. If the results of the other man's experience had been known, those several thousand dollars, as well as a great deal of his employees' time, would have been saved. Worse still, the idea may have been found unsuccessful in the other factory and consequently it will prove so in his own.

Andrew Carnegie once said, "Never undertake anything new until your managers have had an opportunity to examine everything that has been done throughout the world in that department."

It is for just such purposes that the various Government bureaus are established in Washington, and more advantages can be gained from them than is commonly recognized. For example, the newly organized automotive section of the Bureau of Foreign and Domestic Commerce bids fair to give some very practical aid to the industry. Export statistics will be improved as to accuracy and detail, while practical aid will be given in solving specific business problems.

This and other Government bureaus stand ready to furnish reliable information concerning many things. The manufacturer can help himself and others by furnishing these bureaus with statistics and by making them real "idea exchanges." Such a policy would pay in the long run. The manufacturer who profits by another's experience saves time and money. Experience is a great teacher, but oftentimes the tuition is high. Before attempting a new experiment it is usually a good idea to determine whether or not it has been tried elsewhere.

Few Cities Lose in October Sales

Likely to Maintain September Showing

Reports from All Chief Distributing Points Reflect Better Business Conditions

NEW YORK, Oct. 17.—Notwithstanding general predictions that automotive sales for October would show a decided slump, business thus far this month has held up remarkably well and in the aggregate promises to equal the record for September. In some sections the total sales will exceed last month's, and in only a few districts has there been a decline thus far. In most distribution centers business is on about the same level as for the past six months. The variation up and down has been unprecedentedly slight.

A survey of actual selling conditions made by correspondents of AUTOMOTIVE INDUSTRIES in the leading distribution centers shows that the only cities in which sales for the first half of October have fallen below September are Des Moines, Los Angeles, Buffalo, Columbus, Atlanta, Youngstown and New Orleans. In none of them has there been a serious drop.

Enclosed Cars Help

Even in Des Moines, where the falling off has been most severe, enclosed-car business in sight is expected to bolster up the month's record of sales. The decrease in business in Los Angeles is attributed to expectation of prospective purchasers that there will be additional price cuts early in the year.

Distribution centers which report a better business for October than September are Detroit, Denver, San Francisco, Dallas and Birmingham. A gratifying feature of the gain in San Francisco is that trucks are leading passenger cars in both the city and country districts. Truck sales up to Oct. 12 equalled those for all of the month of September.

Better business in the Dallas territory is attributed to higher prices for farm commodities. The same is true in the Birmingham section.

Cities in which sales are holding their own as compared with September include New York, Milwaukee, Indianapolis, Minneapolis, Chicago, St. Louis and Topeka.

Reports from all districts reflect improvement in the general business conditions.

HOW RETAIL SALES RUN IN CENTERS OF TRADE

The following table shows at a glance how retail sales of automobiles are running in the chief distribution centers this month as compared with September:

They are better in Detroit, San Francisco, Denver, Dallas, Kansas City and Birmingham.

They are running even in New York, Milwaukee, Indianapolis, Minneapolis, Chicago, St. Louis and Topeka.

They have fallen off slightly in Des Moines, Los Angeles, New Orleans, Columbus, Buffalo, Atlanta and Youngstown.

The market almost everywhere is glutted with used cars and this has a tendency to slow up sales of new vehicles. The consequence may be a curtailment of factory production later in the year.

The outlook for sales in enclosed cars is decidedly gratifying and deliveries in some lines may be delayed because of inability of car manufacturers to obtain bodies.

Used Cars Felt in New York

NEW YORK, Oct. 17.—The metropolitan territory is just about holding its own in October sales, as compared with the September record. Lines which have new models to offer have had a noticeable spurt in orders, although few deliveries are yet on the books. Some other lines are running a little below September so far this month, in the city, while in the outlying counties the general trend is ahead of last month.

The hysterical situation as regards used car values, caused by recent declines in new car prices and by sacrifice offerings of dealers who have made long trades, is having a retarding effect on new car sales.

Falling Off in Portland

PORTLAND, ORE., Oct. 17.—Retail sales of automobiles throughout the Portland district thus far in October have shown a falling off of approximately 25 per cent over the similar period in September. Ford, Chevrolet, Dodge and Buick continue a fair business, but other lines are quite inactive. During the first several days of October there was a flurry of buying due to the fact that purchasers got another split in license fee at that time. Many late September buyers held off until Oct. 1 to get advantage of this lower license rate. This spurt did not last, however.

Trucks Lead Cars in San Francisco

Large Industrial Companies Are Making Purchases for Their Own Use

SAN FRANCISCO, Oct. 17.—October retail automotive business shows a slight but steady increase over September with trucks leading passenger cars in both city and country. Truck sales in this district up to Oct. 12 equalled those for all of September. Country business in passenger cars is improving because of the strengthening of prices the farmers and jobbers are getting for fruit and the sudden great increase in sales of grain to European buyers.

In the cities, cars with new models and substantial price cuts show a stimulated business and standard makes, especially of popular priced cars, are doing what the dealers consider a nice business. Old models are stagnant owing to the anticipation on the part of the public that all lines will present new models at the New York show.

Trucks are making so much better a showing because of the purchase by large industrial companies of fleets for their own use rather than for contract hauling or for regular freight schedules. People and firms who need trucks seem to be realizing that the journey to normalcy is nearly over and that they might as well buy now and get to work with the trucks as delay buying and so hinder the return of business to normal conditions.

Kansas City Goes Ahead

KANSAS CITY, Oct. 17.—October sales of new cars are running ahead of September sales. If the present rate keeps up, October will show a gain of about 20 per cent over September. The sales of new cars are running more than this proportion ahead of last month, but the movement of used cars has declined. This refers to local retail trade; the wholesale distribution is slowing. Sales are keeping up with the volume of October of 1920.

Dallas Improves

DALLAS, Oct. 17.—Retail sales of automobiles, tires and accessories for the first half of October exceeded those for the first half of September. Dealers say this is due to reduction in the prices of cars and an increase in the price of farm commodities. The increase in the Dallas territory is about 10 per cent and in the Houston territory about 15 per cent. The outlook for the remainder of the year is bright, retailers declare.

(Continued on page 792)

Nation Turns Eyes to Motor Trucks

Vehicles Would Meet Looming R. R. Strike

Entire Automotive Industry Offers Its Services Through N. A. C. C.

NEW YORK, Oct. 18—Menace of a general railroad strike which threatens practical paralysis of rail transportation, has centered the attention of the nation upon motor vehicles.

Motor trucks never have failed in an emergency. They saved France in the great war; they kept business moving during the "outlaw" railroad strike. They will be mobilized to feed the nation if the railroads cease to function.

In the last great railroad strike the country was helpless for motor transport was unknown. It is significant that when announcement of the general strike call was made by the Brotherhood leaders Sunday, there were few gasps of apprehension.

Mayors of cities from one end of the country to the other countered immediately with the statement that their people would be fed by the mobilization of huge fleets of trucks to bring in and distribute food.

If no trains are run the mails will be transported by motor trucks and airplane.

Industrial paralysis will not follow a general strike because many factories can be kept in operation by the use of trucks to haul supplies and finished products.

Motor trucks figure prominently in the plans of the administration for meeting a strike. The War, Navy and Agriculture Departments are surveying the field to determine the number of trucks which can be mobilized. The same procedure is being followed by many states and by countless cities.

57,000 Trucks in New York

More than 57,000 motor trucks are available in the five boroughs of New York to transport food and other necessities in the event of a strike. It is estimated they could transport 28,000,000 lbs. of food a day if it could be obtained within a day's journey of the city.

The United States Army has about 200 3½-ton trucks in the city and the Navy about half that number. Only about half these trucks are being used by the Government and the others will be available in an emergency.

READY FOR EMERGENCY, REEVES TELLS HARDING

NEW YORK, Oct. 17—Alfred Reeves, general manager of the National Automobile Chamber of Commerce, sent the following telegram to President Harding at the White House to-day.

"Cars and trucks totalling 9,200,000 can protect public in event of rail strike.

"We offer service of automobile industry in mobilizing of motor transport if needed.

"Local automobile owner and dealer associations have the organization, man-power and vision for emergency."

A special meeting of the Motor Truck Association has been called to gather data necessary for the immediate mobilization of motor equipment. Similar information is being collected by Health Commissioner Copeland, who will have charge of the rationing of the city in an emergency.

Arranging Food Transportation

If there is danger of an actual food shortage it is probable officers of the Motor Transport Service of the Army may be asked to take charge of the service under plans which were worked out in 1919. The distribution of food by the Motor Corps, which will be mobilized, will be under the direction of the Health Department.

No decision has been reached by the American Railway Express Co. and other owners of large fleets of trucks as to what disposition they will make of their vehicles if the railroads cease to function.

Motion picture interests are making arrangements to distribute films by truck if it becomes impossible to move them by express.

Could Meet Emergency

The 990,000 motor trucks in use in the United States hauled 1,200,000 tons of freight in 1920, or half as much as the railroads carried. These vehicles can readily handle the more essential products in case of a strike.

There are 3,000,000 motor vehicles in use on the farms of the country, including 139,000 trucks. If the motor vehicles in any large community were mobilized for the emergency, they could readily handle the suburban and inter-urban passenger traffic which ordinarily goes to the railroads. This is true even in great centers like New York and Chicago.

Government Makes Mobilization Survey

Proposed Method: Would Force Allocation to All Centers of Population

WASHINGTON, Oct. 18—Mobilization of motor vehicles under governmental auspices has again established the essentiality of motor trucks. Government officials frankly admit their dependence upon this mode of transportation to stave off the effects of a railroad strike which is regarded as almost a certainty.

Survey of motorized equipment owned or controlled by the Government has been ordered by the Secretary of War. Plans drafted by the Council of National Defense to meet transportation emergencies are being studied with a view to revision to meet changed conditions.

Ascertaining Location

As the crisis develops all agencies, private and governmental, are inquiring into the number of trucks and other motor vehicles available and their location. There has been some talk of creating as an emergency position a Director of Traffic who would co-operate with various governmental agencies in getting motor vehicles to strategic points.

This method would force allocation of trucks to centers of population. However, no definite plans have been made up to this time as governmental agencies are using all influence to bring about an amicable adjustment of the differences between the railroad operators and workers.

Army Has 31,529

Statistics furnished AUTOMOTIVE INDUSTRIES to-day show that the War Department has available 31,529 motor vehicles of all sorts which are serviceable. These machines are located at army depots, posts and warehouses throughout the country and could be sent to various cities whenever desired. These machines would be operated by the army personnel and it is possible that some would be turned over to the Post Office Department for transportation of mails and foodstuffs.

Inquiry shows that the Bureau of Public Roads has 1197 trucks, 215 automobiles and 27 ambulances in service throughout the country. Other statistics show that 21,124 trucks have been delivered to various State highway organizations out of a total allotment of 27,983 vehicles.

The Bureau of Public Roads says that highway transport was never in better position to meet demands for transport-

(Continued on page 797)

Peerless Anticipates Capacity Production

Goal Set by Collins Would Mean Output of 10,000 Cars Yearly

CLEVELAND, Oct. 17—Capacity production for the Peerless Motor Car Co. within a comparatively short time is the goal set by R. H. Collins, new president and general manager.

This means the turning out of cars at the rate of 10,000 per year. At the present time the output is about 10 cars a day or at the rate of about 3500 cars a year. Last year the plant turned out 6000 cars.

These figures indicate that Collins has a man's sized job on his hands. But there have been developments which have caused men in the financial district here to believe that the goal will be reached and at no distant period.

With the vigor and intelligence that marked his connection with Cadillac, Collins has gone about his task as president and general manager of Peerless. While the ink on the contract for the sale of the plant was wet, he had plans already under way for the development and expansion of the business.

Some of his confidential advisers have been on the job at Peerless for some time. These experts have been in conference with W. H. Staring, production manager, and other officials of Peerless. B. H. Anibal, former chief engineer of the Cadillac company, and a body engineer who is nationally known are two men who have been representing Collins in what has been going on at the Peerless plant since the purchase of the controlling interest.

Collins would not discuss his plans before he left the city for a short trip to the West. It is said, however, changes will be made in methods in the company's sales organization, and that gaps in the organization will be filled. No changes in the personnel are contemplated at present.

The old officials left Collins a rich heritage in the form of financial stability. Cash and securities on hand aggregate a value of \$4,000,000, while the quick assets total \$8,000,000. The outstanding bills amount to but \$400,000.

Body Builder Buys Moore Motors Plant

DANVILLE, ILL., Oct. 17—Idle since the failure of two years ago, the plant of the Moore Motor Co. here has been purchased by the L. C. Graves Co., a corporation of Springboro, Pa., manufacturer of commercial car and truck bodies, and will be operated under the name of the United Automotive Body Co., employing approximately 500 men. The new company will be capitalized for \$1,250,000.

The United Automotive Body Co. of Cleveland was recently absorbed by the

KEEP DOORS CLOSED ON JACKSON MERGER

NEW YORK, Oct. 19—Close secrecy still shrouds the proposed merger of 14 automotive companies in which the Jackson Motors Corp. and the Traffic Truck Co. will be included. It is believed, however, that the various companies will be taken over by the Associated Motor Industries, which has been incorporated in Delaware with a capital of \$80,000,000.

Every effort has been made to prevent information concerning this corporation from becoming public. The papers were filed by the Corporation Trust Co. of America, which is located in Wilmington. The incorporators of record are attachés of the trust company.

No clues are contained in the incorporation papers and the Wilmington company declines to reveal even the name of the attorney or where the offices outside of Delaware are located.

L. C. Graves Corp. The latter was organized in 1870 for the manufacture of horse propelled vehicles. F. O. Darling is general manager and R. M. Hawn chief engineer of the Graves company. The former will make his headquarters here.

The Cleveland office is to be closed, but branches at Detroit, Lansing, Toledo and Youngstown will be continued.

Associate President of Lafayette Resigns

INDIANAPOLIS, Oct. 17—Charles W. Nash, president of the Lafayette Motors Co., announces that he has accepted the resignation of D. McCall White as associate president of the Lafayette company. White feels that the corporation has reached a point in its development of the Lafayette car where his services as a designing engineer are no longer required. Management of the company will not be affected in any way and no successor to White will be appointed.

Dunlop Stock Falls with Dividend Passing

LONDON, Oct. 15 (By Cable)—The Dunlop Rubber Co., Ltd., has passed its dividend on £5,000,000 of preference stock because of the depreciated value of rubber and cotton supplies on hand. This decision seriously affects the prospects for a dividend on the parent tire stock.

The announcement resulted in further depreciation of all classes of Dunlop stock. Some critics regard the passing of the dividends as a conservative policy but others recall that the company issued 3,000,000 pounds sterling of 8 per cent debenture stock to straighten out its financial difficulties only a few months ago.

Ford May Purchase Another Railroad

Secures Option on Line Which Will Give D. T. I. Entrance to Cincinnati

CINCINNATI, Oct. 17—The following copyrighted dispatch bearing a Cincinnati date line has been sent out by the United Press:

Possibility of a Henry Ford railroad extending from Detroit to Cincinnati was intimated in Ford's exclusive statement to the United Press that he had secured an option on the Cincinnati, Milford & Blanchester, which gives his Detroit, Toledo & Ironton an entrance to Cincinnati.

B. H. Kroger, one of the principal owners of the C. M. & B. traction line, announced that Ford held an option on the road.

Although his party is not concerning itself with negotiations for purchase of other lines, Ford announced that his secretary was to consult with officials of the Cincinnati, Milford & Blanchester Traction Line.

"If the figure is right I have told my secretary to notify officials of the road that I would be interested," he said. The road would be converted into a branch of the Detroit, Toledo & Ironton Railroad.

"If the Government will let me have Muscle Shoals I'll teach it something about solving unemployment problems," he stated further.

Ford would not go into details about his plan.

"There are jobs in this country for every man who wants to work," he said. "The solution of all this trouble is simple after it has been explained, but it is too long a story to tell now. We have shown this country something about employing men, but that is only a start to what we can do if we get Muscle Shoals."

The Muscle Shoals plant was established by the Government during the war for manufacture of nitrates. Ford offered to take over the establishment to manufacture fertilizer, but his offer has not been accepted.

Kansas City Bringing Delinquents to Court

KANSAS CITY, Oct. 18—The number of suits on account being filed in the county circuit courts, indicates that merchants are going after delinquent customers most aggressively. Among the suits are numerous ones for the recovery of motor cars or trucks, sold on time, or on which petitioners hold notes.

It is evident, without the direct testimony of merchants, that "patience has ceased to be a virtue," and that they have carried the delinquents as long as they care to.

Among the suits are noted several against garages.

Business Reviving, Truck Sales Show

Better Country-Wide Conditions Indicated by Increasing Need for Transportation

NEW YORK, Oct. 17—Steadily increasing sales of motor trucks of all capacities have tended to arouse an even greater feeling of confidence in the automotive industry than the surprising way in which passenger car sales have held up. The demand for motor trucks fell off in direct proportion to the general business depression and the fact that many more trucks are being purchased demonstrates conclusively that business as a whole is coming back.

Freight Cars Move

When there were no goods to be moved there was no need for trucks but with the general expansion in manufacturing and the increasing need for transportation, trucks have come into their own again as the best means of handling short haul business. Truck sales have risen steadily as the number of idle freight cars on the railroads has decreased, showing the close relation between rail and highway freight traffic.

Sales by approximately 60 of the leading truck companies for the second quarter show an increase over the first quarter of more than 5000 or nearly 40 per cent. In many cases companies reported an increase of 100 per cent in sales. This was particularly true in the case of those specializing in heavier vehicles. The Dodge truck business for the second quarter increased 500 per cent over the first quarter. When production figures for the third quarter are available they will show, in general, fully as great, a gain over the second quarter.

Heavier Types in Demand

Among manufacturers of the heavier types of truck International Motors and the White Co. are leading their competitors by a considerable margin. The former, which has been doing a satisfactory business all through the year, delivered more trucks in September than in any month since June and for the first 10 days of October took twice as many orders as for the same period in September. The White company has shown a steadily increasing business each month since May. The Packard company reports deliveries of commercial vehicles in the Metropolitan district 50 per cent larger in September than in August and that the present month promises to be equally good.

Pierce-Arrow also is doing a much better truck business. The Autocar Co., which had an increase of 100 per cent in the second quarter over the first quarter, reports that while July and August were comparatively dull there was a marked increase in demand in September and that October promises to be the best month of the year.

While there almost always is a sea-

TWO TIRE PRICES CUT; MAY BE GENERAL MOVE

AKRON, Oct. 18—The Miller Rubber Co. announces to-day a 15 per cent reduction in price on the two most popular sizes of its fabric non-skid automobile tires. This is accepted in Akron as the beginning of another general tire price cut, although no other Akron company will admit that it contemplates reductions. The Miller reductions cover the 30 x 3½ and the 30 x 3 sizes.

KENT, OHIO, Oct. 18—D. M. Mason, general manager of the Mason Rubber Co., announces a 15 per cent price reduction on cord tires, effective at once. He states that the cut is made possible by capacity production and "absolute freedom from high cost inventories."

sonal slump in the sale of passenger cars in the winter months, truck business does not fall off to such a great extent and it is probable that manufacturers of commercial vehicles will be able to make a very satisfactory showing on the year's business.

Forming Shaw Motors to Produce \$700 Car

DETROIT, Oct. 17—Shaw Bros. Motor Car Co. is being organized in this city for the manufacture of a four-cylinder car which will sell for between \$700 and \$800. The car will be conventional in its type, but will embody several new construction features which will be patented and limited to exclusive Shaw use.

The car will be known as the Shaw Bros. or Shaw, the name not being fully determined. It has been designed by E. R. De Luiz, formerly an engineer on the Ford staff, and experimental models are nearing completion. E. P. Telotte, former Buick representative in this city, has been named sales manager of the company.

The Shaw brothers, William and Roy G., who are heading the new company, are well known in Detroit automotive and financial circles. Roy G. Shaw was formerly a factory executive at the Ford plant, while William Shaw has been connected with Buick in sales capacities. The company will be capitalized at about \$3,000,000. The first cars will be exhibited at show time.

Set Definite Dates for Argentine Show

BUENOS AIRES, Sept. 19 (By Mail)—The dates of the fourth automobile exposition of the Automovil Club Argentino, in the Pabellon de las Rosas, have been fixed as Nov. 12 to 27.

Straight Side Tire Campaign Started

Rubber Association Will Distribute Booklets Extolling Advan- tages Over Clincher Type

WASHINGTON, Oct. 17—More than 50,000 booklets extolling the advantages of the straight side over the clincher type of tires will be distributed in various countries by the Rubber Association of America in its work of developing world sales on American-made tires. This booklet is now being put on the press, its translation into several languages having been finished. An effort will be made to circulate the first copies in England before the close of the Olympia show in November.

The straight side campaign is the work of P. L. Palmerton, who recently resigned as foreign trade secretary for the association to become chief of the rubber division of the Bureau of Foreign and Domestic Commerce. Palmerton is the author of the booklet now coming off the press and its distribution will be under his supervision, this work having been retained by him when he left the association.

The records in Palmerton's office show that the straight side is continuing to gain popularity throughout the automotive markets of the world. This also is true of cord tires larger than Ford sizes. Practically 25 per cent of all tires exported in August were of cord construction, and nearly four-fifths when the Ford sizes are eliminated. Sales of cords in the Ford sizes are growing in the foreign field, but the percentage is still small, fabrics dominating this branch of the business.

Favor Reorganization of Texas Motor Car

FORT WORTH, Oct. 17—Group meetings are being held wherever in the Southwest enough stockholders live to vote on assessing shares for reopening the Texas Motor Car Association. Thus far, the meetings have resulted in approval of the assessment. Two hundred stockholders have given their assent to the plan.

It was announced accordingly by Chairman L. W. Hilbrun of the assessment committee that reorganization would be started immediately in the affairs of the company and the factories in South Fort Worth will resume operation. At present, the company is in the hands of two receivers who are operating only the body works and repair shops. Production was discontinued last fall.

The group meetings will continue all this month, or until every stockholder has been given an opportunity to vote for or against the assessment. The stockholders are being assessed 25 per cent of their original stock in the company. Many have paid in the actual cash.

Ricardo Will Read Paper Before S. A. E.

Program of Society for Winter Season Will Include Three Meetings

NEW YORK, Oct. 18—The winter meetings of the Society of Automotive Engineers will include the annual meeting in New York, Jan. 11-14; a meeting in Chicago on Feb. 1 and a tractor meeting in Minneapolis, Feb. 8.

Harry R. Ricardo of London has accepted the society's invitation to present one of the principal papers for the annual meeting. This will deal with his automotive research work, some records of which have appeared from time to time in *AUTOMOTIVE INDUSTRIES*.

Among the reports to be submitted to the standards committee is that of the Iron and Steel Division, revising and bringing up to date the present S. A. E. steel specifications. H. M. Crane, chairman of the research committee, and Dr. H. C. Dickinson, manager of the new research department, will also submit reports.

Among other papers to be read at the annual meeting are the following:

Air-cooled Engines, by Charles Lawrence; Car Upholstery, by R. F. Quaintance; Body Seating Dimensions, by George E. Goddard; Manufacture and Application of Paints and Varnishes, by L. V. Pulsifer; California Tops, by Paul W. Steinbeck. Papers on lubrication will be presented by Dr. Herschel of the Bureau of Standards, Prof. R. E. Wilson of Massachusetts Institute of Technology and Neil MacCoull of the Texas Co. The Fuel Session will include papers on Spectroscopic Studies of Combustion by Thomas Midgely, Jr., and W. K. Gilkie; Evaporation of Engine Fuels by O. C. Berry and Measuring detonation by T. A. Boyd. The Bureau of Standards will co-operate in providing material for this session.

The Material Session will include papers on Aluminum Alloys by Zay Jeffries, Malleable Iron by Enrique Touceda, Rolled Forgings by G. R. Norton. Papers on drop forging practice and alloy steels are expected.

The Passenger Car Session will be devoted largely to discussion of brakes, with a paper on this subject by J. Edward Schipper, and one by S. Von Ammon on Brake Lining Tests at the Bureau of Standards.

The meetings in New York, Chicago and Minneapolis will include the usual dinners.

Motor Vehicle Value Told to Hardware Men

ATLANTIC CITY, Oct. 20—Alfred Reeves, general manager of the National Automobile Chamber of Commerce, in an address to-day before the annual convention of the National Hardware Association declared that "a few years more will see America on wheels, with millions of motor cars and trucks co-ordinating their service with the railways, waterways and trolleys."

MEN REPLACE WOMEN AT REMY FACTORY

ANDERSON, IND., Oct. 18—Announcement has been officially made at the Remy Electric Co. plant that its contribution to the nation-wide effort to relieve unemployment would be the placing of men in positions now held by women, particularly in the cases where married women are concerned.

Five women in one department also have husbands employed by the factory. It is understood that these will be the first women to go. World War veterans, it is planned, will be given preference in filling places of women, although the announced policy of the company is that married men first will be employed.

"Our people demand the best form of transportation, and the motor vehicle, whether for merchandise, for bus lines or for individual service, will on meritorious performance secure its share of patronage, with the proper share going to the railroads, trolleys and waterways," Reeves said. "Each has its place and each can be helpful by increasing the efficiency of the nation."

Mitchell Producing New 6-Cylinder Engine

CHICAGO, Oct. 17—W. L. Jacoby, president of Mitchell Motors Co., Inc., entertained 75 of his distributors at a dinner at the Blackstone Hotel here to announce to them the production of a new six cylinder engine. The following day the whole party was taken to the factory at Racine, Wis., to see demonstrations of the new product.

Speed and hill climbing tests were given and it is said that the characteristics of the new engine stood out prominently in these tests. The engine is known as the F-50 and the features of it, as claimed by the Mitchell engineers, are greater fuel economy and flexibility. The distributors were enthusiastic over the performance of the new product and reciprocated with orders that will enable the Mitchell plant to increase its production schedule for some months ahead.

Goodyear Sales Exceed Business of Year Ago

AKRON, Oct. 17—As a striking instance of the distance the rubber industry had swung back toward normal, Edward G. Wilmer, president of the Goodyear Tire & Rubber Co., states that notwithstanding the fact that sales during the first six months of 1920 had exceeded those of any period in the company's history, more tires had been sold during the 10 months up to Oct. 1, 1921, than in the same period a year ago. In September the company sold 69,000 more tires than in September a year ago, Wilmer says.

Runabout Brings Rover Big Profit

British Company Is Proposing to Distribute Dividend of 10 Per Cent

LONDON, Sept. 30 (*By Mail*)—Profit of the Rover Co., Coventry, for the year was \$511,595 compared with \$655,000 in 1919-20 and \$720,340 in 1918-19. It is proposed to pay a dividend of 10 per cent, put \$50,000 to the reserve, write \$50,000 off the cost of the employees' canteen and sports club and carry forward \$168,740 as against \$132,140 brought in.

This company has paid several very large dividends in the past but in October, 1919, the shares were doubled by a bonus distribution, and the dividend, which just before had been 25 per cent was reduced last year to 10 per cent free of tax.

Most of the year's success is attributed to the air-cooled two cylinder light runabout which has had an output nearing 200 a week for some time. The company's other model, a "12" of conventional type, has suffered by this change in demand, but it is fairly certain that as soon as manufacturing costs fall enough to cut the sales price discrepancy, which is about 100 per cent between the two cars, the more expensive model will regain its pre-war favor.

The likely advent of similar light cars announced by the Wolseley, Belsize and others indicates that competition will be intensive in this class of car which must militate against the Rover company's chances of earning the big profit just announced. The Rover company, however, is more fortunate than some of its competitors in the line in having the capital to finance the purchase of material at lowest rates, and in having but one stable type, as compared with the three or even five models of some other companies entering the air-cooled light car market.

Madison Tire Adopts Expansion Program

BUFFALO, Oct. 17—A general expansion program has just been inaugurated by the Madison Tire & Rubber Co. of Buffalo.

The officials state that their finances are in excellent shape and that the expansion of their distributors' organization is based on the substantial financial condition of the company.

J. M. Dine, general sales manager, recently with the Oldfield company, has been elected vice-president in charge of sales. Frank H. Brewster, who has been with the company as superintendent for 20 years, has been elected vice-president in charge of production. Charles B. Brewster, whose services with Madison date back to 1913, has been elected assistant treasurer. Fred Griscomb is the chief engineer.

3,000,000 Tires Liquidated in Year

More Than \$50,000,000 Has Been
Released by Akron
Manufacturers

AKRON, Oct. 17—The extent to which Akron rubber tire manufacturing companies have readjusted inventories and have re-established themselves on a substantially sound basis of operation both from the standpoint of available working capital and from the viewpoint of potential sales, is revealed by announcement of the fact that since Jan. 1 approximately 3,000,000 tires have been liquidated out of finished goods inventories.

This estimate is conservative according to officials of the B. F. Goodrich Co., who state that an actual survey of inventory readjustments of Akron companies, both in Akron and in warehouses scattered throughout the country, no doubt would show a much heavier tire liquidation. Goodrich alone since Jan. 1 has reduced its finished goods inventory by more than one million tire units.

More Capital Available

This heavy liquidation of tires has meant the release of between \$50,000,000 and \$75,000,000 in working capital with which to re-establish the tire industry on a sound basis, according to W. A. Johnson, Goodrich automobile tire sales manager.

This fact is significant from several viewpoints.

First, the release of more than \$50,000,000 in working capital makes available finances with which to now expand finished goods inventories and also provides working capital with which to lay plans for a substantial spurt in the tire industry next year.

Second, the heavy liquidation of tires means not alone increased production, but the re-employment of perhaps thousands of men before Jan. 1 in Akron tire factories.

No Low Ebb Production

So far this year, for every tire built from two to three tires have been sold. With inventories down to a basis of rock bottom and as low as they perhaps ever will be in the history of the industry, all major tire companies are in a position to expand inventories. From now on until such time as inventory expansion is definitely undertaken, the present status of the industry in Akron means that for every tire sold a tire must be built.

Johnson emphatically disputes the generally accepted belief that Akron and the tire industry face another disastrous winter of low-ebb production, straitened financial circumstances for the major companies, and heavy unemployment of men. He cites the present status of the tire industry on a basis of inventory liquidation, to corroborate his contention that by Jan. 1 the tire industry will be back to normal and that soon

1251 SUGGESTIONS MADE IN FRANKLIN CONTEST

SYRACUSE, Oct. 17—The Franklin Automobile Co. has distributed \$3,600 in prizes among its employees as a result of the "suggestion system" put into effect last March. The plan was adopted to cut down the cost of production without lowering the quality of the car. In all, 1251 suggestions were submitted during the first six months and of this number 503 were adopted. There were two first prizes of \$400, two of \$300, three of \$200 and two of \$100. The rest graded down to \$10 each.

after the first of the year the industry will be normal with a plus sign after the word.

One tremendously significant point brought out by Johnson is the fact that the number of tires now constituting finished goods inventories is less to-day than the number of tires Akron companies were forced to keep in transit a year and two years ago.

Another significant statement made by him is to the effect that even in the face of one of the worst industrial depressions recorded in the history of America, the automotive industry, of which the tire industry is part, has made progress.

Changes in Directorate Made by Fisk Rubber

NEW YORK, Oct. 18—The Fisk Rubber Co. has made changes in the personnel of its directorate following the financing recently arranged by local bankers. The board has been increased from seven to nine members. The new directors are William F. Cutler, James Dean, Richard S. Russell and Ralph H. Bollard. The resignation of J. D. Anderson, F. T. Ley and G. A. Ludington were accepted. H. G. Fisk, formerly treasurer, has resigned to become vice president.

The treasury department will be centered in New York as a result of the change in policy of transferring the executive departments of the Fisk, Federal and Ninigret companies, under the recent readjustment, to this city.

97,651 Cars and Trucks, Ford September Output

DETROIT, Oct. 18—Ford Motor Co. announces final compilations for September production of domestic and foreign plants was 97,651 passenger cars and trucks. Of this 2,937 were made in Canada and 4,525 at other foreign plants. In addition, 827 tractors were turned out.

All Ford assembling plants are in operation. September output at Detroit of 7,408 vehicles was highest. Kearny was second with 7,036, followed by Chicago with 6,000 and St. Louis with 5,525. October schedules call for total output of 90,000 cars.

Makers Announce New British Cars

Armstrong Siddeley, Wolseley and
Austin Among Firms Describing
Late Models

LONDON, Oct. 3 (By Mail)—A number of British manufacturers are permitting announcements concerning their new models and programs to appear much more in advance of the Olympia show than has hitherto been the case.

The new 18 hp. six-cylinder Armstrong Siddeley (2 $\frac{3}{4}$ x 4 $\frac{1}{2}$ in.) proves to be merely a smaller rendering of the 30 hp. six-cylinder chassis, which it will supplement and not displace. Another and still smaller new model is also in preparation by the same maker, but this will be on quite different lines.

Armstrong Siddeley

The 18 hp. has valves in the integral heads of the cast iron cylinders (the latter formed in threes), push-rod operation and full pressure lubrication. Magneto ignition is continued and also the other main features of the "thirty," that is, dry multi-plate clutch, gearset as unit with front end of torque tube, helical bevel drive, disk wheels, with steering pivots vertical and central, and Marmon type frame and footboards. It will sell at £795 with four-passenger body.

The new light Wolseley, a 7 hp. two-cylinder, water-cooled runabout, will supplement the three existing models, viz. 10 hp. and 15 hp. fours and 20 hp. six. It will be more expensive, though probably better finished externally, than the 8 hp. aircooled Rover, which will be one of its chief competitors, for the selling price will probably be £300.

Austin's Late Model

Austin's new model is a 12 hp., four-cylinder (2 $\frac{3}{4}$ x 4 in.), and this also is much on the same lines as the 20 hp. four, which is to be continued. It has a detachable L head engine, magneto ignition, single plate clutch, four-speed gearset and spiral bevel drive, and with a small four-passenger body will be sold at about £550, which compares with £695 for the "twenty."

Although several firms, Rover, Humber, Daimler and others, have recently made definite announcements as to reductions and prices for the whole of 1922, it appears to be not at all unlikely that they may after all be modified again before the show. The price of the Armstrong Siddeley is causing a flutter and there are other firms still to make their 1922 figures known.

DRIGGS STARTS PRODUCTION

NEW HAVEN, Oct. 15—The Driggs Mfg. Co., which was formed some time ago to build a line of passenger cars, has completed the test car and a first lot of twenty-five cars is being put through for production.

CITIES MAINTAIN SALES PACE IN OCTOBER

Drives Help Chicago

CHICAGO, Oct. 17—Under strong sales drives, Chicago business so far in October compares favorably with September, except for Buick's report of a 25 per cent decrease. Dodge is exactly even, Studebaker even, Nash shows a slight decrease, Mitchell a decrease in the country, Cadillac is even, Pierce-Arrow below normal but equal to September. Other lines place business on the September level.

No Gain in Minneapolis

MINNEAPOLIS, Oct. 17—Broadly speaking, the retail situation shows no gain over September. However, the Ninth Federal Reserve Bank here now owes no outside banks as against \$24,000,000 in November last year. The rediscount rate has just dropped a half cent, the last of the reserve banks to come down. This liquidation and lower rate is expected to be reflected in the motor trade but perhaps not this fall. There is a feeling that price reductions are not over and, therefore, that this is no time to buy. Outside dealers have not been able to borrow adequately on car shipments.

Good Columbus Demand

COLUMBUS, Oct. 17—Despite the fact that the season for the sale of passenger cars is waning, Columbus dealers have been having a fairly good demand. This is especially true of the lower and medium priced lines. Cars averaging between \$800 and \$2,200 have been selling rather briskly when industrial conditions are taken into consideration. The tone of the trade shows a distinct improvement and more optimism has developed among the dealers.

New Orleans Behind

NEW ORLEANS, Oct. 17—New Orleans automobile dealers report business for the first part of October, while holding up fairly well, is somewhat slack as compared with September. This applies more particularly to used cars, which problem the local dealers have so far failed to solve. Part of the slowing up is attributed to the general moving which occurs about this time of year.

Slowing Down in Buffalo

BUFFALO, Oct. 17—Sales of new cars here have slowed down considerably since the beginning of September, although there are a few exceptions among the dealers who report that business is good. All the dealers believe, however, that by next spring conditions will be entirely satisfactory.

It is the used car problem which is giving the Buffalo dealers the greatest concern, for this market has become very sluggish although all sorts of expedients have been adopted to increase sales. The Buffalo Automobile Dealers' Association

has decided to hold its annual show in January instead of in March as has been the custom, in the hope of stimulating sales.

Slackening in Des Moines

DES MOINES, IOWA, Oct. 17—With one or two exceptions, the leading dealers of Des Moines report a material falling off in October retail business as compared with September. Percentages of decreases vary from 30 to 50. One dealer reports a slight improvement and another no change. Ford business is 10 per cent under September. Some good enclosed car business is in sight and is expected to bolster up business the latter part of the month.

Increase in Birmingham

BIRMINGHAM, Oct. 17—With more money in circulation and the Alabama State Fair ushering in October, retail automobile sales for the first half of the month are about 10 per cent higher than for the same period in September. The semi-centennial celebration and the automobile show are expected by conservative dealers to bring them 25 per cent over last month's sales. Fords continue to lead with an average of 15 cars daily compared with 11 in September. Other makes show about the same proportionate gain.

Decline in Atlanta

ATLANTA, Oct. 17—Retail automobile sales in Georgia for the first half of October are estimated at about 50 per cent of sales for the first half of September. License receipts to Sept. 15 will more than double receipts to Oct. 15.

Los Angeles Expects Cuts

LOS ANGELES, Oct. 17—October retail sales are running behind those of the corresponding period in September. The reason assigned by dealers is an anticipated price decline early in the year. The public responded strongly to early announcements of lower prices and subsequent advertising that cuts meant stabilization of the industry and that a further decline could not be expected. The most recent reductions apparently have destroyed buying confidence. There is practically no demand for used cars priced above \$1,000.

Decrease in Youngstown

YOUNGSTOWN, Oct. 17—Sales of high priced cars have increased 10 per cent for the first half of October as compared with the first half of September. Sales of Fords and Dodges decreased 20 per cent. Cars in the intermediate class showed a decrease of 10 per cent and the general average was a decrease of 18 per cent in retail sales with little money available for down payments.

Increase in Denver

DENVER, Oct. 17—Reports from leading dealers show October sales ranging from 65 per cent to 125 per cent of the first half of September. One dealer, whose sales were slightly below September, explains that the difference is due to a temporary shortage of enclosed models and expects the October total to be ahead while some predict the month will show a little less and others that it will prove equal or better.

Indiana Spotty

INDIANAPOLIS, Oct. 17—Retail sales of automobiles continues even with September in the southern counties of Indiana. Northern counties generally are not so good while counties in the central part of the State are doing about the same amount of business in October as in September, with isolated spots showing an increase reflecting local industrial and business conditions. Indianapolis business is little changed from the latter part of September.

Car Week Helps Detroit

DETROIT, Oct. 17—October business in Detroit will exceed September in all classes of cars. The increase has been helped along materially by the enclosed car week under the auspices of the dealers' association. The majority of dealers declare October already is surpassing September. The used car situation is the most serious deterrent to sales.

Cuts Not Felt in St. Louis

ST. LOUIS, Oct. 17—October sales are on a par with September. Publicity on the show which opened Saturday has had a tendency to slacken sales for the past few days with the exception of a few popular makes. The used car market is flooded and the situation is getting serious. Price reductions are not increasing sales to any great extent.

Running Even in Topeka

TOPEKA, Oct. 17—According to retailers, sales for the first half of October have been up to September's high record for the lower priced cars. In the class above \$1,000, however, a much slower pace is being maintained. The used car market has been fair, the output going mainly to farmers. Bankers of the State are assuming a more liberal policy toward automotive paper.

Weather Affects Milwaukee

MILWAUKEE, Oct. 17—October retail sales generally are reported to be holding their own with September although some dealers find that the interest aroused by early September price reductions gradually disappeared in the last two or three weeks. The used car market is glutted. Sales have been slowed up by cold weather.

Truck Operators Form Association

Industries in Indiana Organize to
Hold Conferences for Dis-
cussing Needs

INDIANAPOLIS, Oct. 17—Believed to be the first organization of its kind, the Allied Motor Commerce, Inc., of Indiana, became a permanent organization here this week. Its constitution dedicates it to pursuits that can have an immensely valuable influence on the development of motor vehicle commerce.

The organization is not to replace any now in existence nor does it contemplate taking over the work of any of them. Its purpose is to provide a State conference of all industries using motor vehicles. Legislation, taxation, licensing and all regulatory matters will be primary interests. Through the central organization the full power of the motor commerce of the State can be brought to bear on every problem.

Membership in the conference must be by association, each group getting one delegate for every 100 trucks represented in the group membership. Each association must pay into the A. M. C. treasury \$1 per year per truck.

Interests represented in the permanent organization meeting were the Master Plumbers Association, Indianapolis Transfer Association, Indiana Transfer & Warehousemen's Association, Indiana Automotive Trade Association, Indiana Association of Electrical Contractors, Indianapolis Commercial Warehousemen, Indiana Highway Transport & Terminal Association, Indianapolis Coal Dealers Association, the Associated Cleaners & Dyers of Indiana, and the Indianapolis Sand & Gravel Association.

It is anticipated that by Jan. 1, 1922, the organization will have 17 Indiana State bodies affiliated, representing some 20,000 of the 45,000 motor trucks operating in Indiana.

Complains Against Use of Franklin Tire Name

WASHINGTON, Oct. 18—Formal complaint by the Federal Trade Commission has been issued against A. S. Fox, trading under the name and style of Franklin Tire & Rubber Co., and L. Goodman. Fox, who has his headquarters at Chicago and a branch at Oklahoma City, Okla., is charged with simulating the name of a competitor, the Franklin Tire & Rubber Co. of Kent, Ohio, which is an Ohio corporation and a subsidiary of the Mason Tire & Rubber Co.

The complaint alleges that the Ohio firm through extensive advertising and quality of its products has become widely known to the trade, and that the use by A. S. Fox, as principal, and L. Goodman, as sales manager, in charge of a branch establishment, of the true corporate name has caused confusion in the trade and injury to the Ohio company.

Exports of Automobiles, Airplanes, Trucks, Farm Tractors, Motorcycles and Parts for September and Eight Previous Months

	Month of Sept.				9 Months Ending Sept.			
	1920		1921		1920		1921	
	No.	Value	No.	Value	No.	Value	No.	Value
Airplanes	5	\$17,370	8	\$31,000	46	\$398,574	43	\$271,940
Airplane parts.....		9,331		3,956		516,689		132,534
Commercial cars.....	1,747	3,035,028	472	481,664	22,114	34,592,857	5,945	8,714,623
Motorcycles	1,841	566,217	627	151,380	26,579	7,272,387	9,240	3,011,286
Passenger cars	10,432	12,550,796	2,197	1,870,770	110,226	124,399,542	23,900	26,378,612
Parts, not including en- gines and tires.....		7,311,951		8,570,860		62,426,871		31,126,453
ENGINES								
	1920		1921		1920		1921	
	No.	Value	No.	Value	No.	Value	No.	Value
Automobile, gas.....	2,477	\$397,929	539	\$133,229	29,530	\$4,776,381	6,577	\$1,390,148
Marine, gas.....	539	201,586	197	69,440	7,510	2,408,028	3,591	1,283,891
Stationary, gas.....	2,833	445,363	402	75,307	22,537	3,998,216	7,931	1,901,406
Tractor, gas.....	2,303	2,137,703	72	24,557	17,634	16,834,453	2,697	3,314,473
Total	8,152	\$3,182,581	1,210	\$302,533	77,211	\$28,017,078	20,796	\$7,889,918

New York Registered 4301 Cars Last Month

NEW YORK, Oct. 17—Registrations of new cars of '88 makes in 10 counties in and around New York City in September numbered 4301 as compared with 4575 in August and 7012 in June, the high month of the year.

The figures, compiled by Sherlock & Arnold, publishers of the Automobile Sales Analysis, show a drop of only 274 in September from the August total, which is less than a normal decline, as August usually has a spurt due to pre-Labor Day sales, while September ordinarily has a "dead" week immediately following this holiday, which brings so many people in from vacations and is given up to getting settled and back to work.

Registrations, which are equivalent to deliveries, in the 10 counties follow for the months of the year up to date:

	Approximately below \$2,500	Approximately above \$2,500	Total
January	483	146	629
February	1,409	210	1,619
March	3,396	488	3,884
April	4,811	575	5,382
May	5,468	584	6,052
June	6,522	490	7,012
July	5,457	386	5,843
August	4,216	350	4,566
September ..	3,986	315	4,301
Total to date..	35,755	3,546	39,301

MAKING BUSES FOR AKRON

AKRON, OHIO, Oct. 17—The Northern Ohio Traction & Light Co. is constructing three 25 passenger buses, finished in style similar to the standard make of street car and shod with pneumatic tires and is planning to put them in operation at once on Akron streets not now traveled by street cars.

Automotive Exports Show Distinct Gain

Striking Improvement Noted in
Overseas Shipments of Parts
and Trucks

WASHINGTON, Oct. 19—Automotive exports of passenger cars, motor trucks and parts, not including engines and tires, showed a distinct gain, when considered as a whole, during the month of September as compared with August. The monthly figures covering the foreign trade in these products, as announced to-day by the Bureau of Foreign and Domestic Commerce, showed a striking gain in the overseas shipments of parts and trucks whereas the passengers were practically at the same level as in the preceding month.

The comparative figures are as follows:

	Trucks		Cars		Parts	
	No.	Value	No.	Value	No.	Value
Sept. ..	472	\$481,664	2,197	\$1,870,770		\$2,570,860
Aug. ..	381	434,052	2,237	2,265,328		1,786,886

Other figures given in the monthly report showed that 627 motorcycles valued at \$151,380 were exported during the month as well as eight airplanes valued at \$31,000. To this should be added airplane parts worth an additional \$3,956. The total number of engines shipped during the month was 1210, with a value of \$302,533. Nearly one-half of these, or 539, were automobile engines, the majority of which, presumably, are for assembly into cars in other countries.

The report also shows that the sale of parts is continuing through this year at practically 50 per cent of last year's figures. For the first nine months of 1921, the value of parts shipped overseas was \$31,126,453. For the similar period of 1920, the value was \$62,426,871, tires not being included in either case.

New Haven Railroad Orders Three Macks

Rail Cars Will Be Used for Short Haul Passenger Traffic on Branches

NEW YORK, Oct. 18—The New York, New Haven & Hartford Railroad has placed an order with the International Motor Co. for three Model AC Mack rail cars which will be used to handle short haul passenger traffic on branch lines. This is taken as an indication of the interest being manifested by even the large trunk lines in automotive transportation as applied to railroad use.

The much greater economy of operation of motor-driven rail cars as compared to conventional rail equipment promises to be the salvation of many branch lines, many of which have had to discontinue service or will soon be compelled to do so because the expense of operating steam equipment exceeds the revenues obtainable for the service. Many of the smaller railroads have been using motor equipment for some time with such success that the larger railroads are now planning to use it on branch lines.

New Cars Larger

Several Mack rail cars using for the most part components employed in the Mack AB model truck have been in use by some short line roads for some months, but the cars ordered by the New Haven will be much larger and make a higher speed than those now in use. They will seat 36 as against 31 passengers, and will, in addition, have a baggage room 6 x 9 ft. at the rear. The engine and several other component parts are the same as are used in the Mack AC truck, but the leading four-wheel truck, rear axle and wheels, and the high speed reverse transmission which permits of operation in either direction at about the same speed, are special.

The major specifications of the new Model AC rail car are as follows: Four-cylinder engine, 5 x 6 in. with magneto ignition. Transmission, 4 speeds forward and 4 reverse. Final drive, shaft to bevel gear axle without differential, geared 4.53 or 5.36 to 1 and giving maximum speeds of 35 or 29 m.p.h. respectively. Wheels, forged steel, 20 in. front, cast steel 40 in. rear with locomotive steel tires shrunk on. Brakes on all six wheels, operated manually or by air. Springs, semi-elliptic front and rear with rubber shock insulators. Wheelbase, from center of leading truck to center or rear wheel 22 ft. Body, wood and steel, or all steel construction, inside dimensions 27 ft. 3½ in. by 9 ft. Electric starting and lighting and exhaust heating are provided for.

HAYNES BEFORE SENATE

WASHINGTON, Oct. 17—Elwood Haynes, president of the Haynes Automobile Co., appeared before the Senate

Committee on Manufactures to advocate the adoption of a metric system in this country. He explained the formula of the plan in detail in an effort to denote its simplicity and then compared it with the English system which was declared to be cumbersome and lacking in definiteness in terms used.

He was not speaking for adoption of the metric system particularly as an automobile manufacturer, but urged a change to this plan for general use and as the most efficient method.

Durant May Establish Canadian Export Plant

MONTREAL, Oct. 18—Announcement is made by A. L. Caron of Caron Bros., after a conference in Toronto with W. C. Durant, president of Durant Motors of Canada, Ltd., that the new corporation is considering the establishment of a factory here which will give employment to approximately 2,000 men.

NEW YORK, Oct. 18—It was stated to-day at headquarters of Durant Motors, Inc., that consideration is being given the plan of establishing a factory in Montreal to manufacture cars for export. Nothing definite has been determined but a decision is expected within the next 30 days. If the plan is adopted it is probable the factory of Caron Bros. will be purchased. Caron may be associated with the Durant interests if his plant is taken over.

Authorizes 100 Ford Tractors for Germany

DETROIT, Oct. 17—The Ford Motor Co. reports that foreign trade conditions are constantly improving. The Highland Park plant is making knock-down shipments to Buenos Aires and Copenhagen by way of New York. Sales in England are as good as they ever have been and the Ford business there is one of the sensations of the business world. Production at the Manchester plant is being maintained at 1000 a week.

The Inter-Allied Commission has authorized the shipment of 100 tractors to Germany. The machines will be made at the Ford plant in Cork, Ireland.

Orders Portage Plant Sold to Seiberling

AKRON, Oct. 17—The Portage Rubber Co. has been ordered sold to F. A. Seiberling, formerly president of Goodyear Tire & Rubber Co., unless a new petition of demurrer is filed in 10 days by Harry L. Snyder, referee in bankruptcy. Creditors will receive between 75 cents and 80 cents on the dollar.

Liquidated claims amount to \$1,800,000; cash and accounts receivable, less reserve for doubtful accounts, amount to \$600,000. Inventory, which was figured at \$840,000, has appreciated to approximately \$1,000,000 since the receivership was inaugurated.

Outlines Position of Stewart-Warner

President Smith Says System Will Be Little Affected If In- junction Stands

CHICAGO, Oct. 17—C. B. Smith, president of the Stewart-Warner Speedometer Corp. of this city, in a formal statement points out the company's position with reference to the unfavorable decision of Judge Carpenter in the United States District Court in the litigation relating to patents on its vacuum feed tanks and explains that the company's manufacturing operations cannot be disturbed by the final outcome of the suit. President Smith says:

"In the recent decision by Judge Carpenter in the United States District Court in the case of Seager & Harrington vs. Stewart-Warner Speedometer Corp., concerning the vacuum tank manufactured by the Stewart-Warner corporation, it seems to be understood by the public that the Stewart-Warner corporation will no longer be in a position to manufacture what is known as the 'Stewart Warner Vacuum System.'

"The following are the real facts as issued by our patent attorneys:

"First—The decision does not open the way for the owners of the said patent to enter into the manufacture of vacuum feed devices which it enjoins us from making.

"Second—The recent decision of the United States Circuit Court of Appeals in the Sixth Circuit, in the case of Stewart-Warner Speedometer Corp. vs. Sparks-Withington Co., strongly sustaining the patent claims under which the Stewart vacuum system is made, has effectually prevented and will prevent either the Seager-Harrington patent owners or their licensees from entering upon the manufacture of the Stewart vacuum system.

"Third—Even in the highly improbable event that the United States Court of Appeals of the Seventh Circuit should confirm the decision of the District Court on the Seager-Harrington patents, so that the injunction (now pending appeal) should come into effect, preventing the continuation of the present installation, the Stewart vacuum system would have to be changed only in a minor feature not at all vital to its efficiency in order to be entirely clear of the Seager-Harrington patents as most broadly construed by the recent decision of the District Court.

"Fourth—Car builders who have been dependent on the Stewart vacuum system for their equipment have therefore no occasion to be disturbed by this decision, as the Stewart-Warner Speedometer Corp. will be in a position to continue manufacture of vacuum feed devices of the same dependability as the present device and installation."

J. KARL BAIN DIES

INDIANAPOLIS, Oct. 17—J. Karl Bain, president of the Motor Appliance Co. of Detroit, was found dead in his room in a Fort Wayne hotel last night. He left Indianapolis Saturday afternoon for Detroit. He was secretary to Charles M. Fairbanks while the latter was vice-president from 1897 to 1905.

Steam Cars Making New Popularity Bid

Two Will Appear in Market Near
Show Time—Others in
1922

DETROIT, Oct. 17—Steam cars are to make a new bid for popularity in the near future. At least two will make their appearance some time close to the regular show season and two others are expected on the market some time in the early spring or summer of 1922.

The most advanced of the new crop of steamers is the Coats, several announcements on which have already been made and for which its producers, Coats Steamers, Inc., of Indianapolis, hope to establish a strong demand early in 1922.

Scott Newcomb Motor Car Co. of St. Louis has a new steam car which its engineers proclaim to be correct in design from mechanical and economic viewpoints. Its steam producing principle is said to have overcome the faults commonly experienced in steamers and to present a thoroughly workable application.

Like the Coats, the Scott-Newcomb car has passed beyond the experimental stage and is rapidly nearing the market.

Other steamers known to be in the experimental stages are one to be produced by the Barlow Steam Engine Syndicate, this city, and another the conception of O. C. Trask of Trask-Kennedy Co., this city, automobile dealers. Of the latter too little is known except that they will be steam cars along new lines.

Chassis Components Are Olympia Feature

LONDON, Oct. 15 (*By Cable*)—The truck show at Olympia opened yesterday with a big display of gasoline vehicles as well as a fair showing of steam and electric trucks. A feature of the show was the number of chassis components.

There was a large display of municipal trucks and covered coaches which promise to supplant the open type. Few novelties were to be found.

The general tendency of prices is downward.

While the attendance was not large, the opening speeches indicated a fairly optimistic outlook. The textile trade is improving and a sharp cut in the price of steel has just been announced.

There was a fair representation by American makers, most of whom displayed small vans. The show included 80 vehicles besides 122 displays of component parts and tires.

AUDITING PAN-AMERICAN

DECATUR, ILL., Oct. 18—Auditors now working upon the books of the Pan-American Motors Corp., producers of motor cars and motor trucks, believe that there is a shortage of \$20,000 to

BUS MORE ECONOMICAL THAN RAIL, TEST PROVES

NEW YORK, Oct. 19—A test conducted by the Society of Automotive Engineers to determine the relative cost of railroad and motor bus transportation over long distances proved the motor vehicle to be distinctly more economical. The test was a trip from New York to Aberdeen, Md., and return, a distance of 352 miles. The total running time for the motor bus was 18 hours, making an average speed of 19 miles an hour.

The entire cost of the trip for gasoline, oil, wear on tires, depreciation on the bus, driver's wages and expenses, with 22 of the 25 seats occupied, was less than 1.25 cents per passenger mile. The railroad coach fare is 3.6 cents a mile. The passengers on the trip were members of the Society of Automotive Engineers.

\$40,000, nearer the latter figure, according to a statement from President Edward Danner. The auditors were placed upon the books when the disappearance of W. A. Phares, secretary-treasurer, became known.

New Level of Prices Established by Essex

DETROIT, Oct. 20—The Essex Motor Car Co. has announced further price reductions as follows:

	Old Price	New Price
2-passenger	\$1,375	\$1,195
5-passenger	1,375	1,195
Coupe	1,880	1,395
Sedan	2,230	1,995

The reductions, it is stated, are made on anticipated market conditions in 1922. Open models are now \$180 lower than ever before. The reduction on enclosed models represents \$600 since September, 1920.

DIXIE FLYER LOWER

LOUISVILLE, KY., Oct. 17—The Kentucky Wagon Mfg. Co., manufacturer of the Dixie Flyer, has made the following price reductions:

	Old Price	New Price
5-Touring	\$1,445	\$1,345
Sport touring	1,945	1,545
Roadster	1,445	1,345
Coupe	2,295	1,995
Sedan	2,345	1,995

These prices are f.o.b. factory and are subject to the war tax.

OGREN INCREASES PRICES

MILWAUKEE, Oct. 17—The Ogren Motor Car Co. has made the following upward revision in its prices:

	Old Price	New Price
4-passenger	\$3,850	\$4,350
5-passenger	3,750	4,250
7-passenger	3,900	4,375
Coupe	5,000	5,200
Sedan	5,400	5,500

The company has changed to a Continental 6-T De Luxe engine.

Dealers Opposing Tire Adjustments

National Association Will Also
Take Up Question of Faulty
Construction

CLEVELAND, Oct. 17—Delegates to the first convention of the National Tire Dealers Association, which convenes here tomorrow, will take action on a resolution which will be offered to put the association on record in favor of the elimination of all adjustments on tires. Representative dealers, who are backing the resolution, take the position that the adjustment is something that flares back on both the dealer and the manufacturer. The consumer passes it on to the dealer and the latter to the manufacturer.

The convention will be asked to go on record in favor of the manufacturer's replacing without charge, a tire that breaks down through faulty construction. If it is the consumer's fault he should be forced to buy a new tire, according to the terms of the resolution.

Another resolution will provide that the association shall propose and back legislation that will compel all dealers to tell patrons whether they are purchasing first or used tires.

F. A. Seiberling, former president of the Goodyear company at Akron, who is now building up a chain of tire companies, is on the program for an address on "The Future of the Rubber Industry." C. L. Nevin, assistant governor of the Federal Reserve Bank, will deliver a talk on the business outlook and E. S. Babcox, vice-president of the India Rubber Co., on "A Review on the Value of Co-operative Organization," at a banquet held at the close of the convention. A trip to Akron and Kent for a view of some of the largest plants in the industry and an exhibit of tires and accessories will be among the features of the meeting.

No 3300 Truck Order for China, Hoover Says

NEW YORK, Oct. 17—Current reports that the Chinese Government was in the market for 3300 trucks and had closed a deal with a Canadian firm were denied by the Automotive Division of the Department of Commerce in a communication to the National Automobile Chamber of Commerce.

Merchants and officials in Shanghai were specially interviewed on this subject by the United States Commercial Attaché at the cabled request of this newly created division. They were of the opinion that the number of trucks reported sold to Shanghai Motor Co. was entirely out of proportion to the present market demand and furthermore that the Chinese Government has no funds available for subsidies to encourage motor truck transportation.

Considering Future of Scripps-Booth

May Be Sold as Going Concern— Liquidation of Affairs Possible

DETROIT, Oct. 20—Officials of the General Motors Corp. are meeting here to-day to formulate definite plans for the future of the Scripps-Booth Corp. There is a strong probability that it may be sold as a going concern, but it is possible that its affairs may be liquidated.

Present plans call for an announcement that manufacture of the cars will be discontinued. This probably will be followed by a reduction in prices on those still on the market to insure immediate sale.

It has been proposed to move the present factory equipment from Detroit to another of the General Motors plants, whose organization would take over the servicing of Scripps-Booth cars now in the hands of owners and those which will be sold.

Sarver to Be Transferred

Tentative plans call for utilization of the Scripps-Booth plant as a factory for the manufacture of Buick bodies. It is expected that A. H. Sarver, president and general manager of Scripps-Booth, will be transferred to another place in the General Motors organization. An effort will be made to supply Scripps-Booth distributors and dealers with some other General Motors line if they care to take it on.

The Scripps-Booth Co. was organized in 1916 to manufacture a light moderate price car. It was successful for some time, but its business eventually fell off and it was taken into the General Motors organization by W. C. Durant.

The General Motors Corp. owns 55,204 shares of the 60,275 shares of Scripps-Booth stock outstanding. The public holds 5071 shares.

Corporation Formed in 1916

The Scripps-Booth Corp. was incorporated July 28, 1916, in New York, and acquired all the outstanding capital stock of the Scripps-Booth Co., manufacturer of Scripps-Booth cars, and the Sterling Motor Co., manufacturer of motors. The plants of both were in Detroit. The corporation issued in exchange for the stock of the companies it took over, 32,290 shares of its own capital stock which had no par value.

The corporation offered 25,000 shares for public subscription at \$50 a share in July, 1916, and 62,710 shares were offered to stockholders for subscription at \$8 per share on or before Nov. 1, 1917, to the extent of 1 1/10 times their holdings. At the time it was absorbed by General Motors no dividends had been paid.

When it was taken over by General Motors, A. H. Sarver was president of the corporation and W. H. Little was vice-president. Both retained their positions under General Motors management, but

N. A. C. C. ACTS TO CURB HOTEL RATES AT SHOWS

NEW YORK, Oct. 20—The National Automobile Chamber of Commerce already has taken steps to prevent profiteering by New York and Chicago hotels during the automobile shows. A questionnaire has been sent to all hotel managers asking for their regular rates and other information.

They are asked to go on record as to whether they would require that a room be taken for a week regardless of the number of days it is used during the show and whether there will be any increases in rates because of the probable demand for accommodations.

Little has been in poor health for a long time. Directors of the corporation when it was purchased by General Motors included three men who later became prominent in the General Motors organization. They were W. C. Sills, F. W. Warner and Edward Ver Linden. Warner and Ver Linden have joined forces with W. C. Durant.

Dodge Makes Ready for Canadian Plant

DETROIT, Oct. 17—Arrangements have been practically completed by Dodge Brothers for the manufacture of cars in Canada. A Canadian company with the same owners and officers as the American company has been formed and negotiations for a factory site in Ojibway, one of the border cities, are near the closing point.

An executive at the Dodge factory said they were prepared to go in for manufacture in Canada on a large scale as soon as they consider conditions right. This is not likely, however, to be for some time to come.

The Ojibway site, of 24 acres, on which the options are held adjoins the plant of the Canadian Steel Corp., Ltd. Funds have been placed in Canadian depositaries coincident with the forming of the company, so that all preliminaries have been complied with pending the decision to proceed with construction.

Up to this time the Dodge business in Canada has been handled through a dock leased from the Canadian-Pacific Railroad, on which Dodge cars built in the United States were stripped of tires, windshield, lamps and batteries, and Canadian products substituted. The cars were run over to Canada under their own power.

SAVAGE BUYS CANADIAN SITE

DETROIT, Oct. 17—The Savage Automotive Co., incorporated in Toronto as the Canadian branch of the English company, has purchased a site at Sandwich, Ont., for a factory and it is expected it will build a light car along the lines of the British product.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

The local money market last week displayed a firmer tone than in the previous week. Call money ranged from 5 per cent to 6 per cent during the week, with most of the business done at the latter figure. The range for the previous week was 4½ per cent to 5½ per cent. The stiffening of rates was attributed in part to Government withdrawals on Saturday from local banks of \$117,000,000 in preparation for maturing certificates of indebtedness and interest payments.

On Monday of the present week, following Government disbursements in excess of the withdrawals, call money renewed at 5 per cent with a low of 4 per cent, while on the "outside" market funds were available at 3½ per cent. Time money showed a firmer tone toward the end of last week when rates advanced to 5½ per cent for 60 and 90 days' paper, as against 5¼ per cent to 5½ per cent in the previous week. The longer maturities up to six months were unchanged at 5½ to 5¾ per cent. The commercial paper market remained unchanged, with few transactions.

The statement of the Federal Reserve System as of Oct. 11 showed a decline in the reserve ratio from 69 per cent to 68.5 per cent. This was a consequence of decreased gold reserves of \$3,667,000, increased bills on hand of \$23,608,000 and \$28,533,000 in deposits. Federal Reserve note circulation declined \$6,002,000. The statement of the New York Federal Reserve Bank, showing a decline of \$22,098,000 in total gold reserves, reflects the movement of funds to the interior to satisfy seasonable crop demands.

Gold imports for the month totaled \$66,515,000, as against \$39,110,000 in the corresponding month of 1920, while exports were \$2,448,000 as against \$17,129,000 in September of last year. As a result, the net excess of imports amounted to \$64,067,000 as compared with \$85,540,000 in August. The excess of gold imports for the nine months' period amounted to \$54,422,000, as against an excess of gold exports for the corresponding period of 1920 of \$60,443,000.

There have been further evidences of improvement in the industrial situation, especially as regards steel, copper and oil, although the horizon is at present clouded by the possibility of a general railroad strike by the members of the Four Brotherhoods on Oct. 30.

CORRECTION

CLEVELAND, Oct. 18—The statement was made by AUTOMOTIVE INDUSTRIES of Oct. 13 in its announcement of the National Association of Automotive Bankers that the headquarters would be located in the Gotham National Bank building "in this city." The headquarters will not be located in Cleveland but in the Gotham National Bank building, New York.

Willys to Establish Indianapolis Branch

**Distributors Whose Services Are
Discontinued Will Remain
as Dealers**

INDIANAPOLIS, Oct. 17—The Gibson Co. within the near future will discontinue its retail and wholesale distribution of Overland and Willys-Knight motor cars, which will be assumed by a new Indianapolis Willys-Overland branch, and will henceforth devote its entire organization and energy to its automotive accessory and equipment business.

The Gibson company is one of the oldest automobile and accessory concerns in the country. It began the distribution of Overland automobiles and of automotive equipment in the early days of the industry, 23 years ago. Its Overland territory has been the largest of any distributor.

In taking over the motor car distributing departments the Willys-Overland Co. will pay cash to the Gibson company for its automobile and parts departments, and will conduct the Indianapolis branch in the same building where the business has been located. The Gibson company will retain part of its present headquarters. R. E. Butler will be the branch manager.

Distributors to Be Dealers

TOLEDO, Oct. 18—Many of the Overland distributors who have been eliminated from the Willys-Overland organization under the plan which will become effective Nov. 1, will remain as individual dealers. Dealers who formerly sold cars under distributors will deal direct with the factory distributing organization, which is Willys-Overland, Inc.

A considerable increase in export demand for Overland cars has been noted in the past few days. More than 1,000 orders for foreign shipments were received last week.

After payment by the company of another 10 per cent on its bank loans on Nov. 1, reducing them to \$16,000,000 from the peak of \$43,000,000 only a few months ago, the company will still have about \$6,000,000 in cash.

Harper Joins Brother

PHILADELPHIA, Oct. 17—John N. Willys, head of the Willys-Overland Co., and Walter P. Chrysler, executive vice president and general manager, made addresses at a get-together meeting of 600 dealers in Overland and Willys-Knight cars, at which Harry B. Harper, retiring head of the Overland-Harper Co., was toastmaster.

Following the speeches, the dealers, who were from Eastern Pennsylvania, Southern New Jersey, Delaware, Maryland, Eastern West Virginia and portions of North Carolina, were introduced to the new house organization of Willys-

Overland, Inc., which succeeds the Overland-Harper Co.

Harper is now associated with his brother, Paul I. Harper, in the firm of Harper & Harper, handling Handley-Knight and Willys-Knight cars. Paul I. Harper for eight years served under Henry Ford. In 1910 he organized, with another brother, the Harper-Overland Co., in Washington. At the outbreak of the war he sold out his interest and went to France. After being mustered out of service in 1919, he joined the Overland-Harper Co., of Philadelphia, as secretary and treasurer.

Drops Springfield Branch

SPRINGFIELD, MASS., Oct. 17—The Willys-Overland Co. is to discontinue its Springfield branch Nov. 1, and the distribution of its cars in this territory will be placed in the hands of some reliable dealer. This is in conformance with the company's policy of reducing costs and getting in closer relations with the dealers.

The Willys-Overland Building will be sold. This building was erected five years ago, and is one of the best-appointed sales and service establishments in New England. It is understood that William G. Northrup, the present manager of the Springfield branch, is to take charge of the Boston branch, which will be the distributing medium for this district.

No Change in Republic

ALMA, MICH., Oct. 18—Colonel Frank E. Smith, first vice-president and general manager of the Republic Sales Corp., denies the rumor that the establishment of factory branches in Boston, New York, Baltimore, Pittsburgh, Detroit and Chicago foreshadows the replacing of the company's present system of distribution.

Government Prepares Mobilization Survey

(Continued from page 787)

tation. Figures compiled by this agency indicate that all records for highway construction have been shattered this season and as a consequence thousands of miles of roads are open as safe and dependable arteries of commerce.

Post Office officials are speeding up repair work in garages and getting airplanes ready for service. The department has about 250 serviceable aircraft and this figure is greatly augmented by War and Government flying machines. It is believed that reserve aviators will be called into service if it is necessary to operate these planes for transportation of mails.

This department for a time operated a motor truck service to Washington, furnishing transportation for farm products. This system of truck to market may be revived. Government officials have stated that motor vehicles will be operated if necessary under Government supervision and with armed guards to prevent interference.

Strike Will Find Plants Prepared

**Factories Are Well Stocked for
November Business—Have
Coal Supplies**

DETROIT, Oct. 18—Leaders in the automotive industry, though agreeing that the railroad strike would be a catastrophe to the business life of the country, are of the opinion that so far as the industry is concerned, it could not come at a more opportune time.

So far as shipping of finished cars is concerned, roads all over the country are open in November and driveaways would not be impeded in any way by snow or weather conditions. No one wants to go back to driveaways, but no transportation tie-up will stop deliveries except to far distant points.

Driveaways Unhindered

Unimpeded roads will also permit factories to use their trucks to bring in supplies where needed, although most factories find themselves fairly well stocked for taking care of November business. Factories with their own power plants are well stocked with coal in most instances, and the Detroit Edison Co., with its lesson of the last tie-up still fresh, has ample stocks for the winter months.

The cost of bringing in material by truck, where it will have to be resorted to—and the industry is resolved that no rail tie-up shall interfere with its sales—will mean an extra burden in costs, but all costs will be absorbed to keep trade channels open.

If the strike is long lived it is thought that another strong argument will be provided for utilizing motor trucks for all short haul work and that many industrial houses will become permanent users of truck transportation in intercity deliveries.

C. A. Benjamin Becomes Marmon Representative

INDIANAPOLIS, Oct. 18—C. Arthur Benjamin, one of the most widely known men in the automobile field, has become associated with Nordyke & Marmon Co. as a district representative. Benjamin's activities will center in the East, his territory including New York, Philadelphia, Boston, New Haven, Poughkeepsie, Providence, Springfield, Portland, and other cities in that vicinity.

When Benjamin left the bicycle business some years ago he became associated with the Franklin Motor Car Co. He was sales manager from the time the first car was sold until 1906. Since that time he has been in the automobile division of the American Locomotive Co. until that division was discontinued, and as C. Arthur Benjamin, Inc., held the Packard agency in Syracuse. He was in the service of the Government during the war.

MEN OF THE INDUSTRY

William Beckman, for many years assistant to Fred S. Duesenberg and prior to that chief engineer of the Loew-Victor Engine Co. of Chicago, is now vice president in charge of engineering of the newly formed Richelieu Motor Car Corp. of Asbury Park. The company is assembling chassis in a temporary plant while the bodies are being fitted at the plant of the Fleetwood Metal Body Co. The directors of the Richelieu corporation are interlocking with those of the Rochester Motors Corp. and the car will be powered with a four cylinder Rochester-Duesenberg engine.

H. R. Sturgeon has become associated with the John O. Munn Co. Sturgeon was formerly connected with the advertising activities of the Willys-Overland company, first at the Toledo headquarters and later as advertising manager of the John N. Willys Export Corp. at New York. Before that he was assistant advertising manager of the F. B. Stearns Co. at Cleveland. C. E. Duncan, formerly connected with the Willys-Overland company and the White Co., has been elected a director in the Munn concern.

William S. Knudsen, associated with the Ford Motor Co. for the last ten years, has resigned from that organization to become general manager of the Ireland & Matthews Mfg. Co. Before joining the Ford company Knudsen served as general superintendent of the John R. Keim Mills, Inc., Buffalo.

Henry Thomas Platz has resigned as chief engineer of the Alvo Co., automobile headlight division, at Ashland, Ohio, to become engineer of design for the Gray & Davis Lamp Corp. at Amesbury, Mass. He formerly was chief engineer of the C. M. Hall Lamp Co., Detroit.

H. H. Doehler of the Doehler Die Castings Co., Brooklyn, is one of the speakers booked for the factory management class of the University of the City of Toledo this winter. Many officials of the Willys-Overland and allied automotive plants in Toledo are enrolled in the class.

William A. Bechberger has severed his connection with the New York office of the Fisk Rubber Co., where he had charge of fabric purchasing. He was for ten years the company's purchasing agent at the plant in Chicopee Falls, Mass., before removing to New York.

White Co., Cleveland, has established a factory branch in Louisville for the selling and servicing of White motor trucks. Charles M. Moon has been appointed branch manager. The branch has taken over the business of the White Truck Co. of Louisville.

Homer McKee, formerly in charge of Cole Motor Car Co. sales and advertising, has been appointed advertising counsel to the Cole organization. **Charles S. Crawford**, formerly chief engineer of the Cole company, has been named engineering consultant.

W. A. Sullivan, formerly sales representative for Oldsmobile in Pennsylvania territory and before that advertising manager of Oakland Motor Car Co., Pontiac, has joined the staff of the Automobile Trade Directory in Detroit and Michigan territory.

George L. Sawyer, formerly sales manager of material handling machinery for Barber-Greene Co. of Aurora, Ill., has been appointed New York representative of the Universal Crane Co. of Elyria, Ohio. His headquarters will be in New York City.

Frank H. Gibbes, who has been vice-president of the Gibbes Machinery Co., distributor

of Packard, Paige and Durant cars in South Carolina, has been elected president to succeed his brother, A. M. Gibbes, who died a few weeks ago.

W. T. McHatton, formerly of the Republic Motor Truck Co., has been appointed southwestern district representative of Ruggles Motor Truck Co., with headquarters at Denver.

E. E. Wentz, for five years in the Maxwell-Chalmers advertising department, has resigned to go into business under the name of Cady & Wentz with offices in Detroit.

E. C. Hugh of The Hugh Co., Buffalo, has returned from a short visit to Europe, taken for the purpose of disposing of surplus stocks of American-made millimeter size tires.

E. T. Herbig, sales manager of Service Motor Truck Co., Wabash, Ind., has resigned to become associated with General Motors in the sales organization.

Frank G. Vanderhoff has been appointed sales manager of the Ray Battery Co. of Ypsilanti, succeeding Wallace B. Blood, who has resigned.

J. T. Aubrey, advertising manager of the Packard Motor Car Co., has resigned to become advertising manager of Hearst's International.

Henry Farrington has been appointed sales manager of the Antigo (Wis.) Tractor Corp., which is now in production and making deliveries.

Milton R. Standish has been appointed vice-president, in charge of promotion of the Gill Storage Battery Co., San Bernardino, Cal.

Dever Waters has been appointed sales manager of the Schwarz Wheel Co., Philadelphia.

Use of Parenti Plans
Restrained by Court

BUFFALO, Oct. 17—Three former members of the Parenti Motor Corp. are restrained in an injunction, issued by Justice Pooley in the Supreme Court, from using or imparting to anyone plans, ideas and features, said to have been developed by the president of the corporation, Joseph S. Parenti.

Those included in the restraining order are Louis F. Vremsak, Willard C. Wheeler and John W. Lease.

Parenti alleges unlawful use has been made of certain drawings and plans, covering exclusive and patented features of the automobile, bearing his name, by the Adria Motor Car Corp. of Batavia, N. Y., of which Vremsak, Wheeler and Lease are officials. He charges that these men obtained secret possession of blue prints and patents in the Parenti plant in this city, while they were assisting him in experimental work. They are now using these, he alleges, in advertising that they intend to build a car, which will include all the alleged exclusive features of the Parenti car.

FORM ADANAC MOTORS

MONTREAL, Oct. 18—The Adanac Motor Corp., Ltd., Lachine, Que., has been organized with a capital of \$50,000 to manufacture a chassis converter for use in connection with a standard Ford chassis. The capacity of the vehicle will be two tons. The final drive is of worm type.

FINANCIAL NOTES

Stromberg Carburetor Co. of America, Inc., for the six months ended June 30, 1921, reports surplus after charges and Federal taxes as \$51,544, equivalent to 68 cents a share earned on the 75,000 shares of capital stock of no par value. Earnings for this period were \$278,237; other income, \$10,005; administration and general expenses, \$221,698; Federal taxes 1921, \$15,000; surplus, \$51,544; previous surplus adjusted, \$2,352,669; total surplus, \$2,404,213. The consolidated balance sheet as of the above date shows the assets to be \$3,242,823, with cash placed at \$188,978; notes and accounts payable, \$304,609, and inventories, \$699,330. The liabilities include notes payable, \$100,000; accounts payable and accrued accounts, \$51,840; reserve for depreciation, \$363,133; reserve for Federal taxes, \$48,637.

Fisk Rubber Co. has filed a mortgage for \$10,000,000 to the Chase National Bank of New York at the registry of deeds in Springfield, Mass. This is in accord with action recently taken by the stockholders in connection with the absorption of the Federal Rubber Co. and the Nineget Co. The mortgage is to secure an issue of 20-year, 8 per cent sinking fund gold bonds in demoninations of \$500 and \$1,000, payable in 1941.

Hendee Mfg. Co.'s annual report for the year ended Aug. 31, 1921, shows a net loss after charges and reserve for adjustment of inventories, etc., of \$912,078, as compared with net profits of \$759,914 in the preceding year. The sales for the year were \$4,139,445, as against \$9,055,357 in 1920, and the costs and expenses in 1921 were \$3,979,057, compared with \$8,301,238 last year.

Elgin Motor Car Corp. through the Argo, Ill., State Bank is offering \$500,000 8 per cent notes at par, dated June 1, 1921; due each June 15, \$100,000 1922, \$150,000 1923 and \$250,000 1924; convertible into common stock at par at any time before maturity. The purpose of the issue is to retire bank loans and enlarge working capital.

Kelly-Springfield Tire Co.'s 10-year 8 per cent sinking fund gold notes are now ready for delivery in engraved form, with coupons attached, in exchange for and upon surrender of the temporary notes at the office of the Central Union Trust Co., New York City.

Kess-Line Motor has obtained the approval of the Michigan Securities Commission for the issuance of \$500,000 in preferred stock, and 25,000 shares of non-par common stock has been validated.

Victor Rubber Co. will pay on Oct. 25 to holders of record Oct. 15 the 1½ per cent preferred dividend which should have been paid in August of this year.

H. H. Franklin Mfg. Co. has declared the regular quarterly dividend of 1½ per cent on the preferred stock, payable Nov. 1 to stock of record Oct. 20.

Winther Motor Truck Co., Kenosha, Wis., has increased its capital stock from \$22,000,000 to \$61,000,000.

ORDERS TRUCK DIVIDEND

DETROIT, Oct. 17—Creditors of the Famous Motor Truck Co., St. Joseph, Mich., will receive a 15 per cent dividend under the terms of an order entered at the final hearing before the bankruptcy referee. Claims totaling \$92,000 were presented, the largest for \$15,650 being from Frank L. Wilkinson, president of the company.

INDUSTRIAL NOTES

Biever Casting Co., Slinger (formerly Schlesingerville), Wis., has taken over and will place into operation at once the Slinger gray iron foundry. The Biever company has been incorporated with \$25,000 capital by John H. and Edmund J. Biever. The plant has been idle for nearly a year. John Biever was for many years connected with the Gilson Mfg. Co., founder and machinist, Port Washington, Wis., and Edmund Biever with the Montana Tractor Co. of Oconto, Wis. They will specialize in light and medium weight gray iron castings for the automotive and agricultural implement industries.

American Motor Parts Co. of Indianapolis, manufacturer of gas engine, automobile and tractor parts and operating a branch at East Moline, Ill., has been incorporated in Illinois with capital stock of \$200,000, of which \$52,820 is to be employed to do business in that state. The president is William Goldstein and the secretary Harry Goldstein, both of Philadelphia. The East Moline branch has moved from the R & V Engineering Co. plants to the Ideal Milling Co. building. James L. Westphall is general manager of the East Moline annex.

Auto-Motor Corp. of Charleston, W. Va., which manufactures automobile and mining car motors at Dunbar, near that city, will transfer its general offices and plant to Point Pleasant, W. Va., within four months. L. C. Pritchard, vice-president and general manager, states that ground will be broken within three weeks for the first unit. The total cost of the plant will be \$250,000. It is expected actual operation will be started by February. In the meantime the plant at Dunbar will continue operations.

Northwest Engineering Works, Green Bay, Wis., manufacturing cranes and hoists and specializing in a yard crane mounted on a crawler type tractor chassis similar to war-time tanks, has been reorganized as the Northwest Engineering Corp., with \$400,000 preferred stock and 1000 shares of non-par valued common stock. The officers are: President, F. W. Hurlbut; vice-president, W. T. Schmitt; secretary and treasurer, W. W. Mutter; general manager, H. G. Barkhausen.

Andrew Nelson and Christian Hansen have established a new plant at Racine, Wis., for the manufacture of passenger car and motor truck bodies, cabs, etc. Nelson formerly was superintendent of the body department of the Mitchell Motors Co. and Hansen for years conducted a trimming and painting shop in Racine.

Kelly-Springfield Tire Co. is about fifteen days behind in orders, notwithstanding that it is turning out 4300 tires a day, of which 2000 are being made at the Cumberland plant. Sales for September were \$2,423,000, as compared with \$1,862,000 for the same month last year.

Moline Plow Co. tractor plant at Rock Island, Ill., will start making motor engines for the Stephens automobiles Dec. 1. Equipment and machinery of various kinds have been purchased from the Root & Vandervoort Motors Co. and the work of transferring and installing the new plant is now under way.

Midwestern Tractor Wheel Co. of Detroit, manufacturing a patented tractor wheel with adjustable cleats, has purchased a site at Amherstburg, Ont., where it will erect a factory. Modern equipment will be installed at a cost of \$250,000. The company is capitalized at \$1,000,000.

New Britain Machine Co. will temporarily suspend the manufacture of the N. B. trac-

tors because of the buyers' strike. The closing down of the plant will affect about 50 men. A small force will be retained to assemble those tractors which have already been ordered.

Harrison Radiator Corp., Lockport, N. Y., has bought property in that city at a cost of \$30,000 for an addition to its plant. The corporation is owned by General Motors and at present is operating at about 50 per cent. When normal the present plant employs 1200 men.

Stanley Welded Wheel Co., North Tonawanda, N. Y., which is erecting a plant in that city, is expecting to be operating at an early date. The company will manufacture wheels for automobiles and will employ about 200 men at the beginning of operations.

Parish & Bingham, Cleveland, report that October sales and production are running ahead of September and anticipate that November and December output will maintain a good average.

Adams Axle Co. of Findlay has closed a contract with Durant Motors, Inc., to manufacture all axles and brake bands for the new Durant cars. The plant has 180 men at work now and expects to double this force soon.

King Trailer Co.'s entire assets at Ann Arbor, Mich., brought \$40,550 at public auction. W. L. Walz of that city was the purchaser.

Lakewood Engineering Co. of Cleveland has moved its Philadelphia office from the Widener Building to the Franklin Trust Building.

Pierce-Arrow Nears
Normal Conditions

BUFFALO, Oct. 17—Colonel Charles Clifton, chairman of the board of directors of the Pierce-Arrow Motor Car Co., has issued a statement in which he says that production and sales activities, which have been increasing gradually for the last three months, now have reached proportions rapidly approaching normal. The factory, he states, is running full time with a force of 4230 workers. He expects this force to be maintained, if not increased, during the next six months.

"Insofar as the automobile industry reflects general conditions throughout the country, our situation indicates a decided improvement in business," said Clifton. "Analyzing the business of the entire automobile industry we find we are getting more than our proportionate share. The unfilled orders we have on hand will keep the plant operating at its regular output until Dec. 1.

"The truck business shows a similar stimulation. In September we shipped twice as many trucks as for any other one month of the year. On Oct. 1 we had more orders on hand than on the first of any month this year."

PICARD QUILTS AS JOBBER

NEW YORK, Oct. 17—A. J. Picard & Co., general automotive equipment jobber with headquarters here, has discontinued its jobbing business and will devote its energies hereafter to distribution of a number of products, including Stromberg carburetors and Gabriel snubbers, which the company has been handling for some time in addition to its jobbing lines.

METAL MARKETS

THERE is no mistaking the overplaying of their hands by those producing interests who announced a second \$5 per ton advance in their sheet prices, effective Oct. 15. In spite of undoubtedly inspired reports that announcement of the impending advance brought out large orders at the old price, the majority opinion in the trade is that the bait failed to work this time. Even those "Independents" who constantly bewail present market prices which, they claim, do not permit them to make both ends meet, question the wisdom of resorting to so sharp an advance as \$5 per ton as a lure for attracting orders at the old price. It is fairly possible, however, that there was another motive connected with announcement of this advance. It is conceded that over the remainder of the year little aside from routine business will be placed. These orders will come through at any price and the thought underlying announcement of the advance might have been that it may bring out some orders at the old price and, in addition, increase the revenue from the slight amount of routine business to be expected in the coming two months. Obviously the \$5 per ton advance in prices for hot-rolled strip steel announced by a Sharon interest is based on the theory that what business in that commodity will come through in the immediate future will be of a strictly routine character and will be placed whether \$5 a ton is tacked on to the price or not.

It is only natural that in the foreground of discussion in trade circles early this week was the effect which the threatened railroad strike would have on the steel market. Aside from the modest number of telegrams with which producers were inundated, all asking that shipments of steel needed to comply with production schedules over the next few weeks be rushed forward with as little delay as possible, there has been no effect market-wise. It is recognized that while a tie-up of the railroads would curtail steel shipments there would be a corresponding curtailment in the shipments of the products into which the steel centers.

Pig Iron.—The reduction in iron ore freight rates of 28 per cent which pig iron producers contend can have no effect on the market for their product, until their present ore stocks have been consumed, has led to the uncovering of the fact that it does not take "a little more than two tons of iron ore to make one ton of pig iron," as frequently stated in the last few days, but only 1½ ton of ore. This figure is on the authority of the American Iron and Steel Institute.

Steel.—Buying by automotive consumers is sporadic. Youngstown reports state that the largest low-priced passenger car builder has ordered suspension of deliveries against certain hot-rolled strip contracts. The same interest, however, recently placed a good-sized order for sheet material to be converted into running boards. Another passenger car interest placed fresh orders for strip steel. But, although Ford, Dodge, Chevrolet and Oakland figure as buyers in the market, specifications for automotive steels have tapered off. Full-finished body sheets are in light inquiry. On the whole, it may be said that automotive consumers are marking time.

Aluminum.—All sorts of bargains continue to be offered, but automotive demand remains in abeyance.

Copper.—The market presents a steady appearance, but if there is any fresh consuming interest it is not visible to the naked eye.